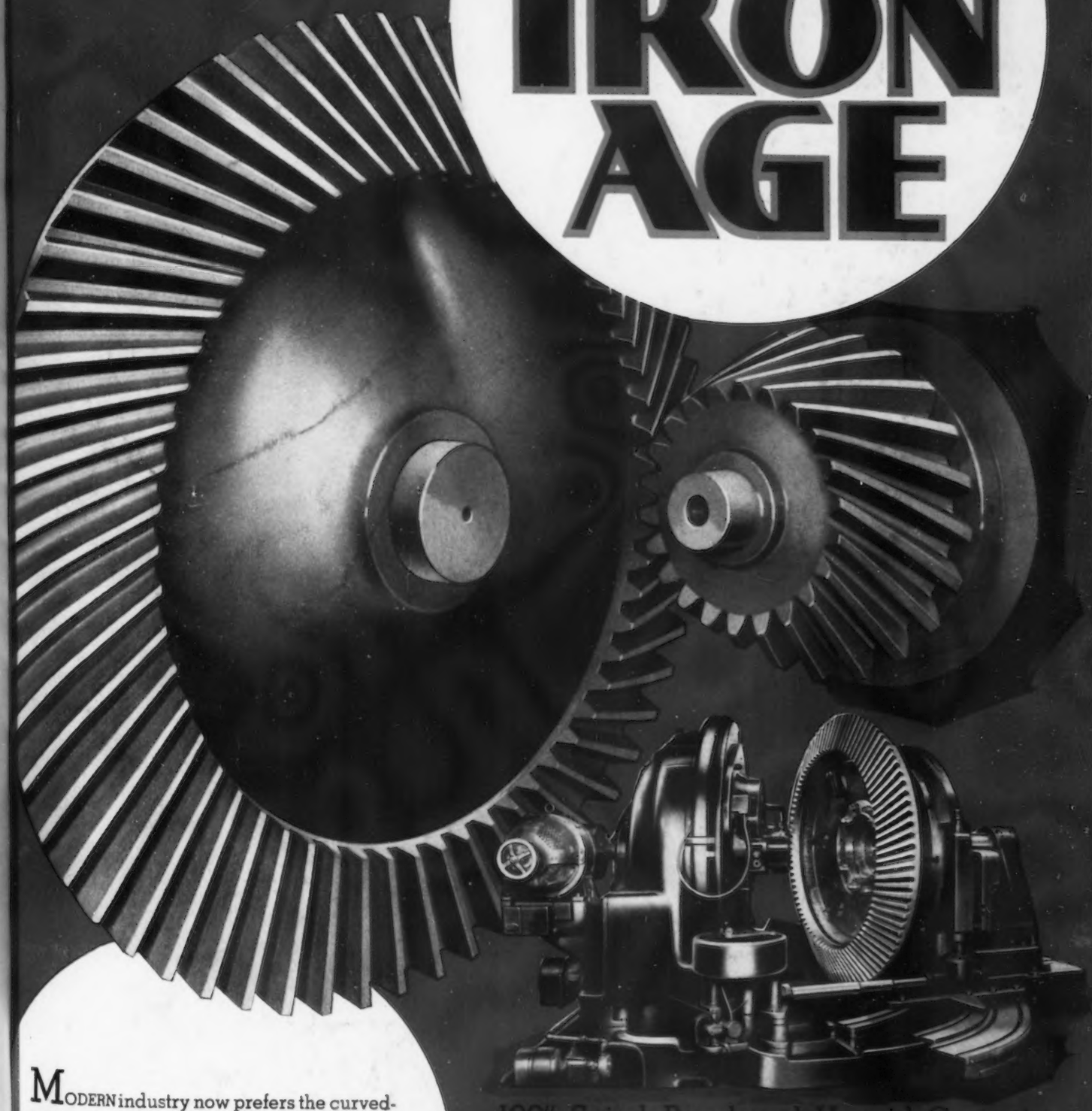
FEB 24

FEBRUARY 24, 1938

THE IRON AGE



100" Spiral Bevel and Hypoid Generator

MODERN industry now prefers the curved-tooth spiral bevel gears for the accuracy, smoothness and high degree of efficiency in their performance. Hypoid gears offer these same qualities beside permitting the shafts to pass. Large spiral bevel and hypoid gears up to 100" diameter are correctly generated for all purposes on the Gleason Planing Generators.

GLEASON WORKS
Builders of Bevel Gear Machinery for Over Seventy Years
1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.

VIGILANCE

VIGILANCE—THEIR HERITAGE

VIGILANCE—THEIR DESTINY

When choice was made for vital parts for these 175 new SOC-1 Scout Observation Biplanes, vigilant eyes carefully scanned qualifications of likely materials. And, for key parts in Tail Wheel Release and Turtle-deck Control, ELEPHANT BRAND PHOSPHOR BRONZE was selected. First—for strength and toughness; second, for long life and resistance to the relentless enemy, Corrosion.

Thus are the "eyes of the Fleet" and the "wheels of all Industry," alike, insured against failures; so, are parts made permanent by the right alloy of the right material—ELEPHANT BRAND PHOSPHOR BRONZE.

175 of these new SOC-1 Scout Observation Biplanes, built for the U. S. Navy by Curtiss-Wright, use castings of ELEPHANT BRAND PHOSPHOR BRONZE for important tail wheel release and turtle-deck control. "There is no substitute for Quality."

In some form—sheets, rods, wire, rope, ingots, bushings or castings—you have a use for Phosphor Bronze. To find it—and the proper alloy—call on our Development Engineers; there's no charge for their prompt cooperative services, no obligation. *Ask for Stock and Price Lists,* to

$3,512,330 invested!
Every part *must* be failure-proof

THE PHOSPHOR BRONZE SMELTING COMPANY

2210 WASHINGTON AVENUE, PHILADELPHIA, P

FRITZ J. FRANK
President

J. H. VAN DEVENTER
Editor

C. E. WRIGHT
Managing Editor

J. A. ROWAN
News Editor

A. I. FINDLEY
Editor Emeritus

R. E. MILLER
Machinery Editor

F. J. WINTERS
Art Editor

T. W. LIPPERT
Metallurgical Editor

Associate Editors

F. J. OLIVER

W. A. PHAIR

G. RICCIARDI

F. JURASCHEK
Consulting Editor

Washington Editor
L. W. MOFFETT

Resident District Editors

T. C. CAMPBELL
Pittsburgh

ROBERT G. BINGHAM
Chicago

D. R. JAMES
Cleveland

W. F. SHERMAN
Detroit

Editorial Correspondents

F. B. RICE-OXLEY
London, England

ROBERT G. McINTOSH
Cincinnati

G. FRAZAR
Boston

P. FIDRMUC
Hamburg, Germany

L. E. MEYER
Milwaukee

CHARLES POST
San Francisco

F. SANDERSON
Toronto, Ontario

ASA ROUNTREE, JR.
Birmingham

LEROY W. ALLISON
Newark, N. J.

ROY M. EDMONDS
St. Louis

F. T. TURNER
Buffalo

★

Owned and Published by

CHILTON COMPANY
(Incorporated)

Publication Office
Chestnut and 56th Sts.,
Philadelphia, Pa.

Editorial and Executive Offices
239 West 39th St.,
New York, N. Y.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, *President*
FRITZ J. FRANK, Executive Vice-President
FREDERIC C. STEVENS, Vice-President
JOSEPH S. HILDRETH, "
GEORGE H. GRIFFITHS, "
EVERIT B. TERHUNE, "
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
JOHN H. VAN DEVENTER
JULIAN CHASE
THOMAS L. KANE
CHARLES S. BAUR
G. CARROLL BUZBY
P. M. FAHRENDORF

★

C. S. BAUR, *General Advertising Manager*
A. H. DIX, *Manager Reader Service*

Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index.
Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year.
Single copy, 25 cents.
Cable Address, "Ironage, N. Y."

ADVERTISING STAFF

Emerson Findley, 621 Union Bldg., Cleveland
B. L. Herman, Chilton Bldg., Chestnut & 56th Sts., Philadelphia, Pa.
H. K. Hottenstein, 802 Otis Bldg., Chicago
H. E. Leonard, 239 W. 39th St., New York
Peirce Lewis, 7310 Woodward Ave., Detroit
C. H. Ober, 239 W. 39th St., New York
W. B. Robinson, 428 Park Bldg., Pittsburgh
D. C. Warren, P. O. Box 81, Hartford, Conn.

THE IRON AGE

Contents

FEBRUARY 24, 1938

The Bird Dog and the Rabbits 25
Wire Drawing 26
Ferrous Metallurgy Pondered at AIME Meeting 30
Labor Relations in Trailer Plant 36
Electrochemical Separation of Alloys 38
Non-Metallic Elements in Steel 42
Developments in Power Drives and Handling Devices 46
Statistics on Metal Working Activity 54
Rate of Activity in Capital Goods 55
Automotive Industry 56
Washington News 60
NEWS CONTENTS 70
Plant Expansion and Equipment Buying 106

▼ ▼ ▼

New Industrial Literature 111
Products Advertised 123
Just Between Us Two 124
Index to Advertisers 148

Copyright 1938 by Chilton Company (Inc.)

A set-up for quick action

. . . in getting bolts to you

JUST get the nearest distributor of Bethlehem Bolts and Nuts on the telephone and name the bolt that you want. (It's a rare call that does not find the item in stock.) Within three hours—on a rush order—your goods will be on their way.

Bethlehem's Lebanon Plant puts the emphasis on a large and varied stock. Thousands of tons of bolts, nuts, spikes, rivets, and specialties are constantly ready to ship. 3500 standard headed and threaded items. Hundreds of specialties. And these stocks can be replenished at the rate of 10,000 tons per month if necessary.

BETHLEHEM STEEL COMPANY, *General Offices:* Bethlehem, Pa. *District Offices:* Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Johnstown, Pa., Kansas City, Mo., Los Angeles, Milwaukee, Nashville, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, Salt Lake City, San Antonio, San Francisco, Savannah, Seattle, Syracuse, Toledo, Tulsa, Washington, Wilkes-Barre, York. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

▲▲▲ THE IRON AGE ▲▲▲

FEBRUARY 24, 1938

ESTABLISHED 1855 Vol. 141, No. 8

The Bird Dog and the Rabbits

ONCE upon a time there was a hunter who depended upon his marksmanship and his bird dog for food. The bird dog would lead the hunter to a covey of birds and after one had been shot would recover it and bring it to his master.

A good bird dog, as you know, must keep his thoughts on his business. His mind cannot wander afield while on duty and he must reserve his day dreams for the kennel.

Unfortunately for the hunter, his good bird dog was killed in an encounter with a bear and he had to get a new one. The new dog made a fine appearance, had a splendid bark and was much more energetic than the old one. However, he had a wandering mind, which was not so good.

When out after a covey of birds the new dog would take it into his head to chase rabbits. Particularly white rabbits. He could not resist them. One day, for example, just as the hunter was expecting to bring down a fat bird for dinner, Rover happened to spy nine old rabbits sitting quietly together on a ledge or bench on the hillside. In a flash the birds were forgotten and that was the end of the hunting for many days because of the disturbance which Rover made throughout the woods by chasing these rabbits.

This was tough luck for the hunter, who had to take in his belt another notch and subsist on gooseberries. But after a time when things had quieted down in the woods, he thought he would try Rover again.

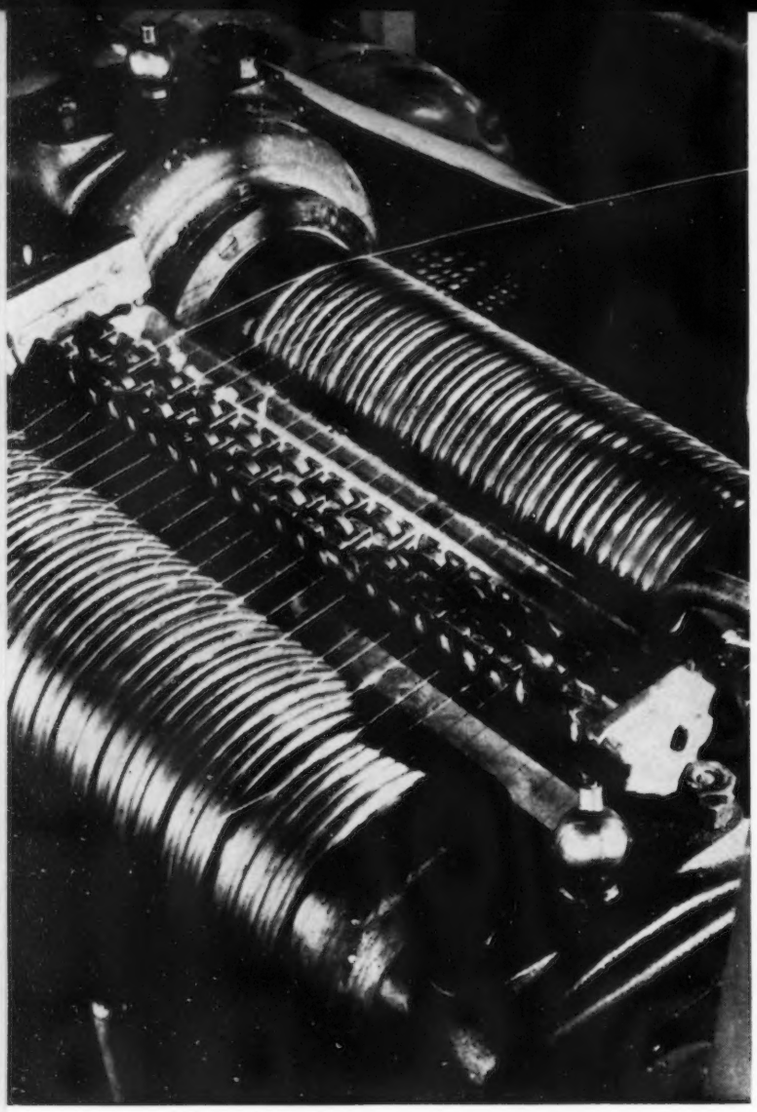
But alas, Rover spied another rabbit. It was a fat one and Rover had a fixed idea that all fat rabbits should be chased down hill. So away he went and away, again, went the hunter's expectation of dinner.

By the time the woods became quiet again, our friend the hunter was almost starving for a good meal. Unfortunately his system could not stand a diet of rabbits and to tell the truth Rover never really caught one, although he spent so much time chasing them. So the hunter determined to try it once more, this time hunting in the bottom of a valley so that Rover would not be tempted to chase fat rabbits down hill.

But he reckoned wrongly on unpredictable Rover. For this time, Rover deemed it his duty to chase thin rabbits uphill and so the dinner was again postponed.

The moral of this story is that chasing rabbits recovers no birds.

J. H. VanDeventer



THE lubrication phase of wire drawing is still in a large measure empirical. It should be particularly appreciated that it is not the efficiency of a lubricant at room temperatures as much as that at the temperature actually attained at the surface of the die which is of importance. Photo courtesy of Ludlum Steel Co.

WIRE DRAWING

o o o

By PROFESSOR F. C. THOMPSON

o o o

DURING the past 10 years or so a large amount of research on wire drawing has been described in print, particularly in Great Britain and Germany. Rather than attempt to cover the whole field, however, the author will concentrate attention on the work for which he has been responsible. As a result of the fact that the mathematical treatment of plastic deformation is still in its infancy, it has not so far been found possible to treat the wire drawing process on rigidly mathematical lines. The attempt of Sachs, for instance, interesting as it is, leads to one conclusion which can be shown to be inaccurate. This work suggests that the power required to draw wire is proportional to the logarithm of the ratio of the original and the final areas. When the reduction of area is being considered subsequently, herein, it will be shown that experimentally the power is not directly proportional to this logarithmic function.

If the subject, however, is dealt with in a simpler manner, from the point of view of the dimensions of the factors involved, it can be shown that the power is directly proportional to the elastic limit of the material to be drawn, the speed of drawing and a factor which depends upon the area. Other factors of a non-dimensional character may, however, be of profound importance, although they cannot be dealt with in this manner. The angle and contour of the die, the temperature at which the reduction is actually effected, the coefficient of friction between the wire and the die, the space lattice of the metal or alloy being drawn are all of obvious importance. Since, however, they are non-dimensional, they cannot be considered in such an analysis.

It also follows from this that the actual pull required is directly proportional to the elastic limit of the original material to the area, but is independent of the speed of drawing. This somewhat remarkable conclusion will be dealt with later. A number of purely empirical relationships based on industrial measurements

have been published from time to time, and Lewis has suggested that the total horsepower required is represented by the following equation:

$$P = \frac{(M)\ (S)\ (A - a)\ (F)}{33{,}000} \qquad (I)$$

where P is the horsepower, M is the tensile strength in lb. per sq. in., S is the rate of drawing in ft. per min., A is the original area of cross section, a is the final cross section of the wire, and F is a variable factor, ranging from 3 with a reduction of area of 10 per cent to 2 at 30 per cent and 1.23 at 50 per cent.

An alternative, and in Lewis's opinion a better relationship is given by the following expression:

$$P = (M)\ (T)\ (F' \log \frac{A}{a}) \qquad (II)$$

where T is the weight drawn in tons per min., and F' varies from 0.12 with 10 per cent reduction of area to 0.084 at 50 per cent reduction.

From equation II it will be observed that the power is proportional to

$$(M)\ (a)\ (S \log \frac{A}{a}). \qquad (III)$$

This may be compared with the theoretical equation proposed by Pomp., Siebel and Houdremont, which, when transformed to correspond with equation III is of identical form.

There would also appear to be a fair consensus among investigators that the power can be represented by such an expression as,

$$P = (M)\ (S)\ (a)\ (fR)$$

where fR is some non-dimensional function of the reduction of the wire, such as the logarithm of the ratio of the original and final areas, or the reduction of area per cent.

Equipment Used

The apparatus used for the high-speed drawing consists of a rigid arm of girder section pivoted on ball bearings about its center. At one end the die is fastened by straps and bolts, the wire passing through a small hole drilled in the arm for that purpose. The pull of the wire on the die tends to swing this arm forward at the one end and to counter-balance this movement there is, at the opposite end of the arm, a piston working in a cylinder into which compressed air is allowed to enter. By a suitable adjustment of entrance and exit valves this piston can be made to restore the arm exactly to its original position, and two electric lamps connected to delicately adjusted contacts show when an exact balance has been attained. The pressure in the cylinder is then a measure of the actual pull on the wire. The apparatus is calibrated by attaching a standard spring balance between the drum and the die. By a system of gears and rheostats the speed of drawing may be varied from about 0.1 to 600 ft. per min., a 7 hp. shunt-wound d.c. motor normally running at a speed of 380 r.p.m. being employed to provide the necessary power.

It has already been pointed out that considerations of the dimensions of the factors involved suggest that the actual pull required to draw a wire is independent of the speed at which the drawing is carried out. If the relationship between the pull and the speed of drawing for 18 per cent nickel-silver is shown, however, it will be seen that at the very low speeds employed the prediction that the pull is independent of the speed is completely falsified, the tension increasing markedly as the speed of drawing is raised. If, however, higher speeds—say 20 ft. per min. or above—are used, then the tension needed to effect a given reduction for a given material is quite independent of the speed at which the wire is drawn. These results have been obtained with tungsten carbide dies of a 5½-deg. semi-angle, but an identical result is obtained with dies of other contours. With steel dies there is some slight tendency for the pull required to rise as the speed is increased, but this is probably explicable on the ground of increased frictional loss. For all practical purposes, except possibly in the case of low-speed draw-bench work, it will be seen that the pull is independent of the speed of drawing, although of course the total power consumed will be directly proportional to that factor.

THE wire drawing process itself, aside from the effect of the process on the mechanical properties of the wire, has been given considerable attention by some prominent engineers. Rather than sketch over the entire field of inquiry, however, the author, who is himself a skilled investigator, has herein reviewed much of his original work on the mechanics of wire drawing, and has in a most interesting manner correlated his work with the published data of other investigators. This article was presented originally as a lecture in Birmingham, England, before the Midland Metallurgical Societies.

It will be appreciated that research which is carried out only at very low speeds of drawing, as, for instance, in a tensile testing machine, may give results which are radically different from those obtained at high speeds under industrial conditions. This danger of relying on research at low speeds will again be emphasized when attention is being paid to the effect of rotating the die during the drawing.

Since the pull required remains unchanged under the conditions of these experiments when the speed of drawing exceeds about 20 ft. per min., there is for experimental purposes no justification in using much higher speeds, and for purposes of economy 30 ft. per min. is the speed which has normally been adopted in this work.

Practical confirmation of the conclusion just reached that the pull required, except at very low speeds, is independent of the speed of drawing, has been obtained both on fine wire and thick rods for bolts, at any rate at speeds up to well over 1000 ft. per min.

In view of this fact, it is curious that in some instances comparatively low speeds of drawing of the order of perhaps 300 ft. per min. are still being employed in the drawing of high-carbon steel wire for ropes. Justification for this procedure is claimed on the ground that age-embrittlement of high-carbon steel wire increases as the speed of drawing is raised. If this is proved to be the case, justification for the practice would be obtained. In an attempt to determine whether the age-embrittlement does depend on the speed of drawing, an investigation has been carried out on medium and high-carbon steel drawn at rates varying from about 30 to 600 ft. per min. So far, at any rate, as change in the tensile strength is concerned, no difference whatever could be detected in the ageing characteristics of the slowly and quickly-drawn wire. It is appreciated, however, that the tensile strength is not of itself always an adequate measure of such embrittlement, and further work in this direction would be justified.

The conclusions to be drawn from the dimensional analysis are in agreement, so far as the relationship of the elastic limit and the tension required to effect a given reduction

through a die of standard contour is concerned. The difficulty, however, of determining the elastic limit of wires makes it the more justifiable to inquire to what extent a similar relationship will hold if the maximum stress is taken as a measure of the mechanical properties of the wire to be drawn. It will be seen that although the scatter of the points for the maximum stress curve is distinctly greater than that for the elastic limit, it is clear that, to at any rate a close approximation, the maximum stress of the original wire is again a measure of the pull required.

Brown and Giraud, among others, have investigated the influence of the reduction of area of a pass upon the work done, and in each case have shown that the pull required is a linear function of the reduction of area. Both sets of measurements were, however, made at low speeds of drawing and on somewhat similar materials, and it appeared well to discover how far the same relationship would hold for other metals and for the higher speeds of drawing. For 70-30 brass, nickel, cupro-nickel and nickel-silver, the same relationship has been shown to obtain up to reductions of 50 to 60 per cent at any rate. In the case of steels, however, the reduction of area-tension curve remains linear only until up to a reduction of something of the order of 30 per cent, the pull required for larger reductions being less than would be expected. How far this deviation in the case of the steel is due to the increased heat generated and the rise of temperature of both wire and lubricant cannot at present be determined, but it is clear that for the non-ferrous materials over a very wide range of reduction and for the steels up to at any rate about 30 per cent, the tension increases linearly with the reduction of area.

As was pointed out, the mathematical treatment suggests that the pull should be directly proportional to the logarithm of the ratio of the original and the final area of cross-section. This is, however, not in accordance with experiment.

The importance of the angle and the contour of the die in successful wire drawing needs no emphasis. Using carbide dies—and it should be pointed out here that, unless the contrary is stated, all the experiments described herein were made with such dies—the results may be summarized by saying that for non-ferrous metals the minimum tension is required with a semi-angle of about 5½ to 6 deg. Smaller angles lead to rapidly increased tension, due presumably to increased frictional losses, the increase with higher angles being much less pronounced. This result has been confirmed for reductions of area varying from 20 to 35 per cent per pass, for a wide range of non-ferrous metals and alloys, for good and bad lubricants, and for material both in the annealed and in the cold-drawn condition. The results for steel are much less simple, a succession of maximum and minimum values following each other over the whole extent of the curve. At first sight, such irregularities would be put down to experimental error, but repeated tests with repolished dies on a range of steels of varying carbon content have satisfied the author that the fluctuations have a real existence. This is confirmed by the fact that, using steel dies, a firm of wire-drawers has independently carried out a similar investigation and found similar maxima and minima. It is at the moment quite impossible to offer any explanation of these results. In connection with the actual drawing of wire there may, however, be occasions when this "optimum angle" of 5½ to 6 deg. is not the most satisfactory. There is, for instance, some evidence that in the case of hot-rolled rod with a rough surface, a distinctly higher angle is an advantage in the preliminary breaking-down treatment. Secondly, in the case of small reductions the necessity for the use of an adequately long bearing to withstand the pressure requires a smaller die angle than that which has been found to be the best for reductions of 20 per cent or over.

The extensive use of the so-called "radial-taper" bearing, particularly in the drawing of non-ferrous wires, makes it desirable to compare this contour with the plain conical dies so far examined. In all cases, both for ferrous and for non-ferrous metals, it has been found that the power consumption with the radial bearing exceeds, and sometimes exceeds considerably, that required for the plain conical die. The difference in the power consumption decreases, however, as the reduction of area becomes greater and as the metal being drawn becomes harder. In the case of "Post Office" bronze, for instance, the power consumed in effecting a 20 per cent reduction through a radial-taper die was 39 per cent higher than that through a die of straight taper of 6 deg. semi-angle. In the case of Monel metal the difference for the same reduction of area had fallen to 16 per cent, and for a reduction of 35 per cent had been reduced to about 10 per cent. The author has, however, come across no single instance in which wire could be drawn through a radial-taper die without requiring a greater tension than is needed for a plain cone with a semi-angle of 6 deg. In the case of carbide dies at any rate, the power required depends to a not inconsiderable extent on the perfection of the polish of the bearing, and variations of over 20 per cent have been obtained for dies of the same contour according as the preparation was more or less skilful.

In every case which has been examined, both with good and bad lubricants, the pull necessary to effect a given reduction of area is less with a carbide than with a steel die of the same contour. When carbide dies are compared with diamond dies, it has been shown that the pull required with the latter is distinctly less than with the carbide die. As an example, for an 80-20 cupro-nickel, 0.044 in. in diameter, the pull required to effect a 20 per cent reduction of area was 44.5 lb. with the carbide die as compared with 35 lb. in the diamond die, the same "Germ oil" lubricant being used in each case.

Despite the great practical importance of the proper "casting" of wire, very little published information on this aspect of wire-drawing is available. The complicated nature of the problem will be appreciated, and it is at the moment quite impossible to explain curves, which have been obtained both for ferrous and non-ferrous materials and using a wide range of reductions of area. To one result of this research, more extended reference may be made. A coil of Post Office bronze immediately on removal from the block was carefully disentangled, when it consisted of two distinct helices, the angles of which were at right angles to each other. One helix, which consisted of the first eight turns of the coil, lay nicely on the floor whereas the remainder could be arranged without the turns overlapping each other on a horizontal string. It would almost appear as if the first few turns of the coil were in this case the whole cause of the trouble. This portion of the coil was found to correspond with that part of the wire which spirals down from the top to the bottom of the block at the commencement of drawing, and if it is found that the same conditions apply to other cases, the trouble might, in some measure at any rate.

be overcome by a modification of the design of the block in such a way that the jaws for gripping the wire are at the bottom instead of, as is usual, at the top of the block.

Importance of Lubricant

Although a very considerable amount of work has been done on lubrication in wire drawing, the number of fundamental facts which have been definitely established is small. Lubrication in this process is still in large measure empirical. One of the most important of all the facts which have emerged is that the lubrication is, in all probability, of the "boundary" type. This offers an explanation of the experimental result that the addition to an oil of a small amount of a fatty acid appreciably reduces the friction and therefore the pull required.

The impossibility under ordinary industrial conditions of determining exactly the pull required to draw wire makes it the more desirable to inquire whether there exists any simple form of apparatus by which an, at any rate, approximate evaluation of the efficiency of a lubricant can be determined. It will be appreciated, however, that it is not the efficiency of the lubricant at room temperatures as much as that at the temperature actually attained at the surface of the die which is of importance.

As the temperature is raised, the pull falls, at first fairly rapidly, and then more slowly, until, at a temperature of about 170 deg., a sudden increase in the tension occurs. This increase is presumably due to the breakdown of the soap as a lubricant, after which the tension required exceeds that at room temperatures and the drawing is distinctly erratic. For all the lubricating materials examined the frictional loss decreases as the temperature is raised, a fact which is a little difficult to reconcile with the elaborate precautions which are sometimes taken to cool the die. There is no obvious reason why tungsten carbide dies should wear more rapidly at elevated temperatures than they do at room temperature, particularly in view of the fact that such dies are successfully employed for drawing tungsten wire at 1300 deg. F. Rapid fluctuations of the temperature of such dies, however, must be avoided as far as possible since there is otherwise a distinct risk of superficial disintegration due to the thermal stresses which are set up.

Reference may, however, be made to one material which has given particularly interesting and unexpected results. Water at room temperature is a particularly bad "lubricant." As the temperature is raised its efficiency improves considerably, and at temperatures just below its boiling point water is almost as efficient as really good soap. Further, the surface of the wire drawn with nearly boiling water is particularly good and suitable for subsequent treatments by processes such as enameling.

The importance of adequately anchoring the lubricant to the surface of the wire will, in view of the boundary nature of the film, be readily appreciated. It is now generally accepted that the value of the "water coat" in the drawing of steel lies in its ability to absorb and retain a stable film of the soap. The extension of the use of such a film to nonferrous wires is a possibility which is well worth exploring.

Another type of coat which deserves mention is that of a soft metal in conjunction, of course, with a suitable lubricant. The coppering of steel wire is a process too well known to need emphasizing here, but other metals, and in particular lead, have been tried with considerable success. In the drawing of austenitic stainless steel tubes and wire the Dudzeele process, in which a lead coating is employed, has been used with success.

One aspect of the use of soap as a wire-drawing lubricant, which is at times of very considerable practical importance, is the skin troubles which operators may suffer through its use. Certain types of soap are particularly likely to cause trouble of this kind, and there are fairly good grounds for the belief that soaps, made from fat including a large proportion of cocoanut or palm-kernel oils, reacting on the skins of those possessing an idiosyncrasy to this complaint, are particularly dangerous. The author has been informed that the trouble may be eliminated if, prior to work, the hands are rubbed well with a mixture of unsalted lard and 5 per cent boric acid.

Rotating Dies

Although rotating dies have been employed to a very limited extent, presumably with a view to increasing the life of the die by distributing the wear as evenly as possible over the whole surface and thus of improving the surface of the materials, the

(CONCLUDED ON PAGE 82)

Ferrous Metallurgy Pondered at

Engineering Societies Bulges With Rec Members Gather to tribute Honors, and Technical

MORE than 2400 engineers, out of a total membership of 10,000, gathered from the four corners of the earth last week at the Engineering Societies Building, New York, as the American Institute of Mining and Metallurgical Engineers swung through its 148th meeting. There was plenty of attraction, what with an elaborate technical program to titillate the metallurgist, physicist, geologist and the educator, all of which was ably leavened with a well developed social program reaching a climax at the annual dinner and dance, at the Hotel Waldorf-Astoria, Wednesday evening, Feb. 16.

With Rolland Craten Allen, president of the Institute during 1937, officiating as chairman and toastmaster, the members attending the dinner were introduced to Daniel Cowan Jackling, president of the Utah Copper Co., and the Institute president for 1938. Subsequently, a number of honors were conferred on members who had served the Institute with credit. The James Douglas Medal, awarded for distinguished achievement in non-ferrous metallurgy, went to H. W. Hardinge, president of Hardinge Co., manufacturers of mining and milling equipment; the Anthony F. Lucas Medal, for achievement in improving the technique and practice of finding or producing petroleum, was awarded to H. L. Doherty, president of Cities Service Co.; the 1938 honorary membership was presented to John V. W. Reynders, one of the most famous of the world's bridge builders, and for many years a professional adviser to steel works and banking institutions; the recipients of the Robert Woolston Hunt Award for 1938 were Thomas S. Washburn and John H. Nead, both of Inland Steel Co., co-authors of a paper presented last year dealing with the structure of rimmed-steel ingots; and for his meritorious study of the performance and selection of refractories for blast furnace linings, Roy A. Lindgren, of Wisconsin Steel Works, was awarded the J. E. Johnson Jr. Award. New members of the Legion of Honor, that is those men who have been on the A.I.M.E. rolls for 50 years or more, also were introduced at the banquet. The ten more members who achieved this distinction for the first time this year are: Henry D. Conant, Karl Eilers, William Gerhauser, David S. Jacobus, Henry Louis, Ellison C. Means, Erskine Ramsay, T. A. Rickard, Olof Wenstrom, and William F. Wilkinson.

Of the many hundreds of technical papers presented in meeting rooms of the Engineering Societies Building, from Monday to Friday of last week, space requirements necessitate that only a few be treated herein. The sessions on blast furnaces and cast iron, Tuesday morning, were particularly interesting, dealing as they did with the "Efficiency of the Blast Furnace Process," by J. B. Austin, of the United States Steel Corp.; "Pressure Operation of the Pig Iron Blast Furnace," by Julian M. Avery, of Arthur D. Little, Inc.; and "Relative Desulphurizing Powers of Blast Furnace Slags," by W. F. Holbrook, of the United States Bureau of Mines.

Blast Furnace Operation

In his paper on blast furnace efficiency, J. B. Austin pointed out that in any consideration of so complex a process as the smelting of iron in the blast furnace, there is obviously no single method of calculating efficiency which gives a complete appraisal of the performance of the furnace in all its several functions; such a comprehensive view as is required to evaluate producing ability and manufacturing costs for a given furnace is obtained only by considering a group of efficiencies, each of which measures the performance of the furnace from a specific point of view. For instance, there is the rate of consumption of coke per ton of iron produced, which is probably the most frequently considered, and is certainly one of the most important, of the group; there is the efficiency of recovery of iron charged; and there is, in some respects related to the former two, yet in other ways, independent from either, the efficiency of utilization of energy, both chemical and thermal. In each of these cases, the calculation can be made on the basis of the actual input of material or energy, or it may be based upon a comparison with the minimum amount of material or energy which would be required by a "perfect" furnace, that is, an imaginary ideal furnace analogous to the perfect steam engine used in thermodynamic calculations, operating under optimum conditions. Moreover, the furnace itself can be considered either as an apparatus for smelting iron, or taking a somewhat less common point of view, as a gas producer yielding iron and slag as by-products. Some of these efficiencies are more useful than others, yet all are instructive, according to Mr. Austin; for knowledge of them not only leads to good engineering practice from the standpoint of control, but also discloses limits to possible improvement in performance and indicates the lines along which improve-

148th A.I.M.E. Meeting

Building, New York, ord Attendance as Elect Officers, Dis- Assimilate Over 250 Papers.

ment is most likely to be profitable. Estimates of some of these efficiencies have appeared from time to time in the literature, but many of them are open to objection; because, according to Mr. Austin, they are based on data of uncertain accuracy or because they have been calculated without due regard to the thermodynamic principles involved. Moreover, so far as Mr. Austin is aware, no general survey of the blast furnace comparing its performance in all the aspects mentioned has been made.

Therefore, in his elaborate paper, Mr. Austin's purpose is to consider and to compare these several efficiencies as calculated from the most reliable data now available. There is no attempt to supply detailed calculations in every instance, but the aim is rather to present a point of view, chiefly as regards the performance of a perfect furnace, with only occasional resort to numerical values, leaving detailed calculations to be carried out by each investigator for the cases in which he may be interested. In using established chemical and physical principles to set up the performance of a perfect furnace, Mr. Austin really sets up a par value, or bogy, with reference to which the performance of a real furnace can be compared.

This establishment of a perfect furnace is developed in considerable detail by Mr. Austin, with the help of several tables and charts. In particular, however, the consideration of the material and thermal efficiencies of the blast furnace considered both as a smelter and as a gas producer lead the author to the following conclusions:

(1) In a blast furnace producing the usual grades of low silicon pig iron, the coke consumption is determined by the demand for carbon as a reducing agent rather than the demand for fuel, for the heat liberated on combustion by the carbon necessary to give the proper quantity of reducing gas, is, together with the heat brought in by the hot blast, sufficient to meet the heat requirements of the furnace. The general heat balance as well as the distribution of the heat generated between hearth (melting) and shaft (reducing) zones is controlled within limits by adjusting the temperature and volume of the hot blast. If the furnace is producing high silicon foundry iron, ferromanganese or ferrosilicon, the heat requirement per ton of product is considerably greater than for the ordinary pig iron grades, and the coke consumption may be fixed primarily by the demand for carbon as fuel, although this may not always be true since the CO/CO_2 ratio at equilibrium is also raised in such cases.

(2) The amount of coke required for giving a proper reducing gas is fixed chiefly by the equilibrium conditions in the reduction of FeO to Fe, and since the equilibrium changes with temperature the coke consumption is likewise influenced. The higher the temperature at which this stage in the reduction is carried out the higher the coke consumption.

(3) Preliminary calculations, taking account of the chemical equilibrium, indicate that a blast furnace using 1800 lb. of coke per ton of pig is over 90 per cent efficient in the utilization of coke.

(4) The thermal efficiency of the blast furnace taken as a smelter is high, being in most cases better than 80 per cent.

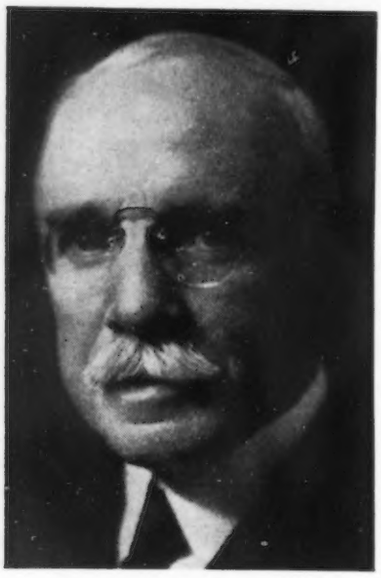
(5) Taking the blast furnace as a gas producer, the maximum conversion of coke to carbon monoxide must be less than that of a gas producer, the relative efficiency being in the ideal case about 70 per cent. An actual blast furnace usually operates close to its own ideal efficiency as a producer, however.

(6) The hot gas efficiency of the blast furnace, regarded as a gas producer, is high, being of the order of magnitude of 90 per cent.

(7) These conclusions all indicate that the blast furnace as now operated is a relatively efficient apparatus compared to other chemical or metallurgical equipment. While improvements in design, in control of operation to give a uniform product, and in reducing heat loss by radiation and conduction are to be expected, there is little hope of making a substantial reduction in coke consumption under that achieved by the best modern practice. It is also clear that any process designed to compete with the blast furnace must, like the blast furnace, show a high efficiency both as a smelter and as a gas producer if it is to have any chance of success in competition with the blast furnace in the steel producing districts, where metallurgical fuel, suitable for blast furnace use, is commercially available.

Pressure Operation of Blast Furnace

In a broad sense, the suggestion of pressure operation of the pig iron blast furnace is not new, for operation under moderately increased overall pressure was suggested as early as 1871, by no less an authority than Henry Bessemer. But the reasons set forth at that time for the use of higher overall pressure were evidently inadequate, because there appears to be no record that Bessemer's suggestion



JOHN VAN WICHEREN REYNDERS,
awarded the 1938 honorary membership to the A.I.M.E. Mr. Reynders is known for his outstanding ability as an adviser to steel companies, and, also, for his skill in putting steel to practical use in bridges and other structures.

was ever put to trial. In any event, since blast furnace literature of at least the past 20 years is singularly lacking in mention of pressure operation, the subject as revived by Julian M. Avery in his paper is a matter of real and timely significance. Mr. Avery in his paper entitled "Pressure Operation of the Pig Iron Blast Furnace and the Problem of Solution Loss," pointed out that most metallurgists and engineers consider that the primary function of the pig iron blast furnace is to produce pig iron at the lowest possible cost, and that its function as a gas producer should be subordinated to this primary purpose. During the past ten years or more, improvements in blast furnace technique and economy have, in fact, been directed primarily to increasing efficiency in the use of the reducing power of the gases produced by combustion of coke at the tuyeres, to reduce iron ore within the furnace. The net overall result is a decrease in the fuel value of the top gas per unit of volume, and per ton of pig iron, which is evidently more than offset in value by the corollary saving in coke and the possibility of increased furnace capacity, for otherwise there would be no point in making such improvements.

While progress has been made in this direction, Mr. Avery's paper points out that there is another approach to the problem of increasing the chemical and thermal efficiency of the blast furnace in its primary role as a pig iron smelter, which appears to offer possibilities of improvement in overall economy of a different order of magnitude than results thus far obtained by the use of other expedients. The present argument is based in large part upon the hypothesis that the efficiency and economics of pig iron smelting are seriously and adversely affected by the phenomenon known as "solution loss," and that the problem of solution loss can be successfully attacked by increasing the overall pressure, i.e., the "top pressure" under which the furnace is operated. It is indicated that pressure operation may also be expected to result in concomitant benefits which may be summed up as generally improved operating conditions, together with a substantial saving in fuel and/or a substantial increase in furnace capacity.

Even though Mr. Avery's paper covered many of the ramifications of the problem, it could not cover in adequate detail or even mention all of the factors involved in the comparative merits of pressure operation. The primary purpose of the paper was to stimulate discussion of this important subject, leaving for later consideration and research problems which are bound to arise, as for instance the amount of pressure required to bring out a given result under given conditions, the effect of pressure upon decomposition of CO in the upper part of the stack, the amount of blast power required, the amount of power which can be economically recovered by expanding the top gases, and the overall economies of pressure operation. Of course, the author studied such factors as far as possible without adequate data. It appears that very substantial benefits may be obtained by using top pressure of the order of from 10 to 30 lb. gage, and that considerably higher top pressures ultimately may be found desirable; that the pressures required need not seriously affect decomposition of CO; that additional blast power required may in most cases be recovered by expanding the top gases; that furnace production may be very substantially increased and probably eventually doubled by pressure operation; and that combined overall fuel economy and savings in fixed charges due to increased capacity may ultimately be expected to substantially exceed $1 per ton of pig iron produced.

This paper by Mr. Avery stimulated considerable discussion to the effect that pressure operation offers a virgin field for development of blast furnace design and operating technique, which shows promise of a handsome reward for the expense and effort which must be expended if substantial results are to be achieved.

Desulphurizing Powers of Slags

In a paper presented two years ago by W. F. Holbrook and T. L. Joseph on the relative desulphurizing powers of blast furnace slags, the method developed for the measurement of this desulphurizing power of slags was described and data were presented covering the range of likely slags containing up to 10 per cent MgO. In a paper Tuesday morning, Mr. Holbrook extended the range of this work to include slags containing up to 20 per cent MgO, and the effect of temperature on 5 per cent and 15 per cent MgO slags over the range 1475 deg. to 1525 deg. C. is included. The method used was that described in the previous paper except that some of the temperature measurements were made with a noble-metal thermocouple instead of a tungsten-graphite thermocouple. Twelve-gram charges of 0.8 per cent sulphur-metal and 5-gm. charges of slag were subjected to heating for 30 min. at a prescribed temperature. The charges were analyzed for sulphur content. For purposes of comparison, desulphurizing power is defined as the ratio of the

THOMAS S. WASHBURN
assistant metallurgist and chief metallurgist, the Robert Woolston Hunt Award for their structure of rimmed

percentage of sulphur found in the slag to that found in the metal. Six slag and metal charges were made coincidentally in 5/8-in. holes in a section of an electrode graphite rod. One slag and metal charge was used as a control by means of which adjustment in the desulphurization value could be made for small variations in temperature and other factors. For convenient presentation of the data, the slags are arranged in groups in each of which one of the four main slag components is constant. Thus, the 15 per cent MgO slags are presented separately from those containing 20 per cent MgO.

In making the studies on desulphurization, a temperature of 1500 deg. C. has been taken as one of the standard conditions. This temperature is within the range commonly observed in blast furnace operation, but other temperatures do obtain and a knowledge of the effect of temperature on desulphurization by slags is desirable, according to Mr. Holbrook. A systematic survey was made at two temperatures other than 1500 deg.; namely 1475 deg. and 1525 deg. C.

JOHN HUNTER NEAD
respectively, of Inland Steel Co., awarded paper presented last year dealing with the steel ingots.

As in the previous investigation, it was found in the current instance that a temperature rise results in an increase in the desulphurizing power of all slags, but the increase is greatest toward the area of viscous highly basic slags. Except in these slags, the effect of temperature change seems to be uniform.

Increased Basicity Improves Desulphurization

The data presented by Mr. Holbrook, together with those previously reported, show the comparative desulphurizing character at 1500 deg. C. of practically any possible slag composition within a range of approximately 30 to 50 per cent SiO_2, 5 to 25 per cent Al_2O_3, and 35 to 65 per cent bases (CaO + MgO), and, in addition, scattered compositions outside these ranges.

The generally accepted fact that increased basicity improves desulphurization is corroborated, but the data show that for a given MgO content there is an optimum basicity beyond which the slags become very poor desulphurizers. The isodesulphurization contours show that the composition is critically related to desulphurization at optimum and higher basicities and less so in the range of less basic slags.

In general, the data show that a slight improvement may be expected from the replacement of a small amount of SiO_2 by a like amount of Al_2O_3. Also, small substitutions of MgO for CaO cause slight decreases in desulphurization. Neither of these statements holds true, however, in the areas of optimum composition.

On the other hand, replacement of CaO or MgO by Al_2O_3 or SiO_2, according to Mr. Holbrook, shows comparatively large effects in most of the composition areas.

Increasing the temperature from 1475 deg to 1525 deg. C. was found to double the desulphurization ratio of most of the ordinary blast furnace slag compositions.

The magnitude of the change in desulphurizing power that may be expected from any given change in the composition of a slag or from any limited change in temperature is shown by diagrams presented in Mr. Holbrook's paper.

Rimming Steel Ingots

All of Thursday morning was devoted to a session on steel making and steel ingots. One interesting paper in this group dealt with the "Evolution of Gases From Rimming Steel Ingots," and was presented by K. C. McCutcheon, of Armco, and John Chipman, of the Massachusetts Institute of Technology.

To a very large extent the quality of a mild steel ingot is determined by the manner in which it is poured into the ingot mold and its behavior during the first few minutes after it has been poured. The formation of the solid rim of metal around the periphery of the mold, the effervescent action of the liquid steel within this solidified rim and the upward or downward movement of the metal level are indications of what is going on beneath the surface of the liquid metal, especially at the interface at which solidification occurs. Observation of this "rimming action" enables an experienced observer to predict the thickness of the sound skin of the ingot and the location and extent of cavities or "blowholes" caused by entrapment of gases. The control of rimming action at the hands of a skillful steel pourer is a vital part of the control of quality in mild steel sheet, and the behavior of the liquid steel during the rimming period is a useful criterion of the melting and refining practices employed in the open hearth.

McCutcheon and Chipman in their paper pointed out that the behavior of rimming steel during solidification depends primarily upon the evolution of gases from the molten metal and it is therefore a problem of considerable interest to determine the nature and amount of the gases evolved. A number of attempts to determine either the amount or the analysis of the evolved gases have been reported by other authors. Klinger, in 1925, analyzed the gases extracted from rimming, semi-killed and killed steel in-

DANIEL COWAN JACKLING,
president of the Utah Copper Co., and president of the American Institute of Mining and Metallurgical Engineers for 1938.

gots and found that the chief constituent of the rimming gas was carbon monoxide. The relatively large amounts of nitrogen reported in his first few samples may be due to incomplete removal of air from the gas collecting mechanism, according to the authors. McCune reported similar studies of rimming ingots from which surprisingly large proportions of nitrogen and hydrogen were evolved. Ameen and Willners determined both the amount and composition of gases extracted from unkilled ingots with the aid of diminished pressure. Their ingots weighed only 176 lb. and apparently were solid within two or three minutes, so that their results are entirely inapplicable to studies of rimming behavior of commercial ingots.

McCutcheon and Chipman in their paper describe the method they developed to collect gases, method of gas analysis and interpretation of results, using in all cases 18 x 39-in. ingots weighing 11,300 to 12,000 lb. The gas samples as analyzed in a modern Burrell analyzer, showed that the principal gas was carbon monoxide, with which were associated smaller amounts of carbon dioxide, hydrogen and nitrogen. The presence of oxygen in any sample was considered evidence of leakage and very few samples showed more than 0.1 per cent of this gas. Small amounts of an unidentified hydrocarbon were found in many of the samples. This was reported as methane, although the authors were not positive that it was accurately identified as such.

In their studies, the authors examined 17 rimming ingots, and the data secured are assembled in an abridged form herein in Table I. Three or four gas analyses scattered through the evolution period are shown for each ingot. In tabulating the data an attempt has been made by the authors to select analyses which are representative of the much larger total number of analyses obtained and to exclude results involving uncertainties arising from faulty handling or the occurrence of more than 0.2 per cent oxygen. The rate data have indicated that at about 7 to 10 min. after the mold is filled one-half of the total gas has been evolved. The analysis of a gas sample during this interval should represent approximately the mean gas analysis for the ingot.

Included in the table is a column showing the duration of the gas evolution. It was noted in general that this is a longer period than an ordinary ingot remains open. The neighboring ingots had always solidified across the top before evolution in the covered ingot had ceased. This difference is probably due in large measure to the insulating effect of the hood which simply causes the surface of the ingot to solidify more slowly.

A column is also included to show the total gas evolved from those ingots on which a satisfactory measurement was obtained. This total includes the amount actually measured plus the estimated volume evolved between the completion of pouring and the beginning of the measurement. The uncertainty in this estimate is fairly large. The data provided no basis for estimating the amount of gas evolved while the mold is being filled. This volume has been roughly estimated from the drop in carbon between ladle and mold and appears to be of the order of 20 to 40 cu. ft.

ROY A. LINDGREN,
superintendent of blast furnaces for Wisconsin Steel Works, recipient of the J. E. Johnson, Jr. Award, for his meritorious study of the performance and selection of refractories for blast furnace linings.

Metalloids in Rimmed Steel

A second paper in the Thursday morning session, entitled "Distribution of Metalloids in Rimmed Steel Ingots," and presented by J. W. Halley and T. S. Washburn, metallurgists with Inland Steel Co., also deserves particular attention because it throws additional light on the metallurgy of rimmed steel, a subject that has received particularly little attention in view of the fact that rimming steels represent a large proportion of the amount of plain carbon steel made.

In their paper, the authors present a particularly able explanation of what rimming steel is, an explanation which is worth repeating here: "Rimming steels derive their name from their action during solidification in the molds. As a result of incomplete deoxidation, gas is evolved during freezing, and the metal has a characteristic rolling action. The metal rises along the mold walls and descends in the center of the ingot. This action keeps the top of the ingot open and the advancing rim of solid metal can be seen. The rim grows until the rolling action is insufficient to prevent the top of the ingot from freezing, or until the action is stopped by capping the ingot with a heavy plate. The violence of the reaction and its characteristics, such as growth or drop in the molds, are determined by the composition, the furnace practice, and the deoxidation in the ladle and in the molds."

The investigation undertaken by Haley and Washburn was made to determine accurately the distribution of carbon, manganese, and sulphur in normal rimmed ingots and the general distribution of other common elements present. The study included some work on the effect of pouring conditions and furnace practice on the distribution, though there is still much to be done in this direction.

Marked differences were found by the authors in the distribution of carbon, manganese and sulphur, which indicates different mechanisms controlling the distribution of the three elements. The reaction of carbon with ferrous oxide in the steel is the most important reaction that occurs during rimming and would be expected to control the distribution of carbon in the rim zone. The decrease in carbon across the rim near the top of the ingot indicates that the concentration of ferrous oxide in the liquid steel at the solid liquid interface increases as the rimming proceeds. Near the bottom of the ingot the pressure exerted by the liquid steel is high enough to nearly suppress the reaction between carbon and ferrous oxide. The presence of the primary blowholes indicates that some gas is evolved but the uniform carbon content across the bottom of the ingot shows that little carbon is removed. It is probable that the gas evolution is so slow that the

bubbles are trapped between the growing dendrites. In the core zone the distribution is similar to that found in a killed steel and is controlled by the rate of cooling, the distance between the liquidus and solidus of the iron-carbon system, and by the rate of diffusion of carbon in solid iron. The average decrease in carbon between the ladle and the solid ingot is about 0.02 per cent.

The concentration of manganese shows a drop across the rim zone similar to that shown by carbon, which probably is the result of the same change in concentration of ferrous oxide during rimming. As the product of the reaction of manganese and ferrous oxide is a solid rather than a gas, the reaction is affected little by pressure, and the distribution in the rim zone changes little between the top and bottom of the ingot. The manganese oxide formed is carried to the top of the ingot by the rising stream of molten steel and gas during the rimming and combines with ferrous oxide to form the slag found on the top of the ingot. Manganese is also removed with sulphur as manganese sulphide. When the ingot is capped the distribution of manganese is determined by the factors that control distribution in killed steel and by the action of the remaining manganese oxide. As the particles of manganese oxide have low density, they will rise until the steel in the core zone freezes. This process removes manganese from the bottom of the core zone and results in the low-analysis area shown by the distribution curves.

The distribution of sulphur is not affected by the ferrous oxide content of the molten metal, according to the authors, therefore there is virtually no change in the concentration of sulphur across the rim zone. There is a slight increase in sulphur from the surface to the secondary blowhole zone, but this increase amounts to only 0.003 per cent at the top of the ingot and less than 0.001 per cent at the bottom. It is too small to show in the curves but is consistent in ingots from different heats and is probably caused by the increasing sulphur in the molten metal during freezing. The elimination of sulphur from the rim zone is probably largely mechanical. The immiscible manganese sulphide is swept away by the rising stream of gas and molten steel. The distribution of sulphur in the core zone is probably determined by the ejection of manganese sulphide by the freezing steel but the quiet molten metal does not permit the elimination of the manganese sulphide in the same manner as in the rim zone. There is enough progressive concentration to make the last metal that solidifies much higher than the rest of the core. There is some increase in concentration of sulphur toward the top of the ingot resulting from the tendency of the manganese sulphide to rise in the molten steel. The sulphur removal during rimming so overshadows this process that there is no low-sulphur area in the bottom of the core zone similar to that shown by manganese.

Influence of Variables

There are so many variables in furnace practice, deoxidation and pouring practice that it is extremely difficult to determine the effect on distribution of any one of the variables. The effect of some changes in practice, such as ingot height, can be determined definitely by varying the practice in different ingots in the same heat. Other factors, such as iron oxide content of the furnace slag, are liable to be overshadowed by other variables

(CONTINUED ON PAGE 110)

TABLE I

ANALYSES OF GASES EVOLVED FROM RIMMING STEEL INGOTS

Heat No.	Total Time in Min.	Ladle Analysis C	Mn.	Gas Evolved in Cu. Ft.	Time After Filling	Co_2	CO	H_2	N_2	CH_4
1	—	0.090	0.35		4.6	5.20	88.3	2.75	3.15	0.60
					7.6	4.80	91.4	2.45	0.85	0.40
					12.2	6.85	89.1	2.45	1.00	0.60
2	29+	0.086	0.35		2.2	4.40	89.80	.65	1.65	3.50
					5.8	4.25	89.55	2.95	2.10	0.15
					9.5	3.45	89.95	3.10	2.90	0.30
					29.2	2.65	89.15	4.40	3.35	0.45
3	34	0.085	0.37		6.5	5.80	89.80	2.95	0.20	1.45
					18.5	5.60	89.40	4.10	0.75	0.15
					30.5	3.20	90.40	4.90	0.85	0.65
4	36	0.070	0.27		4.4	6.20	88.10	1.50	2.10	2.10
					8.4	7.00	87.35	3.30	2.30	0.35
					16.9	5.70	89.30	3.80	2.22	0.00
					35.6	4.20	88.60	3.55	3.45	0.20
5	37	0.071	0.26		3.5	6.10	86.75	3.20	3.80	0.15
					8.0	4.90	90.50	3.45	1.10	0.05
					16.5	4.60	89.40	3.75	2.15	0.10
					35.5	4.60	88.80	4.25	2.15	0.20
6	32+	0.060	0.25		4.0	6.85	88.45	3.65	0.95	0.10
					8.0	6.05	88.25	3.75	1.75	0.10
					14.0	5.20	90.20	3.80	0.70	0.10
					32.0	5.50	89.10	4.05	1.25	0.10
7	39	0.067	0.41	54	4.0	6.40	88.65	3.30	1.20	0.40
					5.5	2.85	91.20	3.60	2.05	0.25
					13.4	2.35	92.40	4.15	0.90	0.15
					23.6	1.80	91.75	5.00	1.05	0.25
8	—	0.073	0.29	62	6.0	4.35	90.65	4.05	0.80	0.15
					14.0	3.95	90.65	3.85	1.30	0.25
					22.0	3.20	91.60	4.25	0.75	0.10
9	42	0.065	0.26	74	6.5	5.90	90.40	3.55	0.00	0.35
					9.5	4.40	91.90	3.65	0.00	0.05
					16.5	3.95	92.50	3.30	0.20	0.05
					35.5	3.00	91.40	3.85	1.75	0.00
10	27	0.07	0.31	48	3.5	4.67	86.17	5.19	0.97	0.70
					7.5	4.75	87.88	5.32	1.35	0.40
					22.0	3.55	89.42	4.62	1.49	0.82
11	38	0.08	0.30	43	4.0	4.77	90.32	4.31	0.10	0.30
					7.5	5.71	88.83	4.28	0.58	0.50
					15.0	3.48	90.06	5.05	1.01	0.25
					32.0	2.60	89.83	5.31	1.66	0.40
12	29	0.035	0.024	45	2.4	10.25	85.77	2.93	0.28	0.47
					7.0	11.27	83.91	3.86	0.25	0.41
					16.0	12.72	82.20	3.83	0.55	0.40
					24.3	14.81	79.82	3.92	0.55	0.30
13	—	0.08	0.34	—	4.0	3.95	90.22	4.77	0.78	0.20
					9.5	7.12	87.08	4.48	0.92	0.30
14	42	0.042	0.021	62	7.3	7.55	88.22	3.29	0.34	0.40
					32.0	9.88	85.33	3.75	0.48	0.35
15	41	0.047	0.030	60	7.8	6.09	89.29	3.46	0.76	0.30
					19.0	6.83	89.35	3.21	0.11	0.40
					37.0	9.81	83.80	3.82	2.12	0.30
16	35	0.085	0.37	38	3.2	3.67	89.20	2.06	2.78	1.61
					7.8	3.67	90.27	4.22	0.87	0.65
					23.2	2.86	88.29	5.85	2.35	0.39
17	35	0.08	0.32	36	9.0	3.78	90.08	4.83	1.05	0.13
					15.5	2.56	89.33	5.53	2.18	0.40
					31.0	1.99	89.01	6.11	2.64	0.25

Labor Relations at Fruehauf

ONLY last spring, when the Wagner Act was declared constitutional by the Supreme Court, many people in Detroit frankly expressed interest in the probable course of a local industry which had so far objected to the act that its case became one of the tests before the Court. The Fruehauf Trailer Co. of Detroit, involved in a question of discrimination against union workmen, received an unfavorable decision and was forced by law to comply with an earlier ruling of the National Labor Relations Board.

Nominally employing some 1300 men in the manufacture of large commercial hauling units, the Fruehauf company first felt its interest in unionization stirred up at the time of NRA, when an American Federation of Labor union tried to organize its plant. The Fruehauf company ousted the union after a "tooth and nail" battle. Shortly after the Wagner Act became effective as law, the company dismissed a group of workmen, so the AFL appealed to NLRB on the basis of discrimination and was given a favorable decision. The case then stood at practically the same point as the present controversy between the Ford Motor Co. and NLRB.

A complete reversal was obtained by the company when it appealed this NLRB decision in the Federal Court at Cincinnati. The union appealed from this Cincinnati decision to the Supreme Court and this became one of the famous Wagner Act test cases.

Labor Relations Improve

Since that time labor relations in the plant have steadily shown signs of improvement. C. L. Halpin, factory superintendent, has had the job of maintaining friendly relations with a CIO union group which grew up while the case was in the courts. Five weeks of negotiations, including a four-hour sit-down strike and two weeks of picketing, preceded the signing of a contract.

"The wisest man is he who learns from experience, not just his own, but that of others. Industry has had to operate for the past four years or more under a wave of labor laws and regulations. Should this wave subside, in how many cases could management say that it had learned, that it had been wise?" Halpin asks. "We are operating on principles and facts—not policy or prejudice; we are able to sell our ideas to our men."

Sharply critical of radical labor leadership which has organized workers for purposes often detrimental to good management, Halpin recalled that he himself started to work seven days a week, 12 hours a day for 96c. a day. He rose in a company through the days when it started its first mass production and installed its first steam turbine electric generator and drum type water tube boilers. For 20 years now he has had charge of groups of men ranging up to 2600 employees and taking in all trades. Since 1921 he has been engaged in metal working activities in Michigan, all that time on an open-shop basis. Some of his conclusions about American industry are extremely critical. All of them, in view of his own recent dealings with labor unions, are interesting.

Management Often Lax

Despite many cases to the contrary which he himself cites, Halpin declares: "American management has been lax in its attitude toward labor. Management owes an obligation to itself to do its part toward raising the level of thinking of the workman so he will have an understanding of the difficulties and problems with which management is beset. Even in cases where management's attitude has been fair, it still has failed to provide, except in rare instances, any educational work directed toward the employees as carried on by the same

Trailer Co.

C. L. HALPIN

business toward its customers. The working man is an important part of any industry but frequently is made to feel cheap and ignored."

At the same time, Halpin points out, "There has been all over the country a definite program under way from more than one source to convert and convince labor to the belief that labor is being persecuted, abused and ill-treated by all in any way connected with management."

He sees reason to believe that "Under existing conditions the average working man in America stands to lose; the cards are stacked against him. It can be said that he has nowhere to turn to find a friend. The paid agitator, for example, is only a tool used to take advantage of the workman's vote, to secure his mass voting strength, but a continuation of principles employed during 1936 and 1937 by the UAW cannot but result eventually in its downfall. In fact, I see an intimation of its dissolution in the recent Detroit election."

As one of the most fertile causes of discontent, Halpin assailed nepotism, declaring that the average foreman, superintendent, factory manager or owner usually considers the jobs which exist in his plant his own property, to be given to friends or relatives even at the cost of discriminating against employees already on the payroll.

No Favoritism Shown

His solution: "No favorites, no relatives, no friends whatever in any position of privilege. We do not favor anyone in our employ except in recognizing service rendered to the company. Our rates of pay are as high as they can be. We settle grievances the same day they are brought to our attention. Our attitude toward our workmen in all cases is that we want the actual facts in fully discussed detail and we base a decision upon these facts. We are endeavoring to build up in the rank and file of our people a confidence in us. It is our intention to be fair and considerate of the human element.

"Our employees have found that we are fair with them and they are coming to appreciate some of our problems. While some of our earlier meetings were long drawn-out and consumed a seemingly endless amount of time, we have gradually arrived at a condition where we understand each other and more quickly adjust our differences."

As an example of some of the benefits which the Fruehauf company recognizes, Halpin says: "Even during the negotiations of the union contract, we were informed by our men of numerous inefficient conditions which existed in our factory. The men were full of ideas which they were sure would result in vast savings of money, a sort of pent-up flood of ideas which had had no chance for outlet. During the past several months this dam has been allowed to crumple and dissipate its accumulation which had no outlet prior to the conferences.

Conferences Promote Understanding

"From the men have come a few good ideas, yet the greater good was the opportunity for them to learn that practical factory routine and profitable operation is based on an equation much broader than their point of view. When repeatedly their belief is in error, they come to have a respect for stable management. There must have been some reason why out of 100 businesses that are started in this country, only 10 per cent last two years and only 5 per cent last five years or longer. We have learned that the time we spend with our men in explaining to them and also acquiring from them an understanding of our mutual problem is well spent, particularly because it results in their understanding part of our problem.

"The average workman does not understand the responsibility of management, but when he does comprehend it, he is quick to change his attitude and assist management to improve the economic picture. He may even feel a resentment toward management for never having presented the picture before."

Electrochemical Separation of Alloys

By ROBERT C. WOODS

Consulting Engineer, Old Lyme, Conn.

A WELDING plant recently received a large consignment of welding rods of two slightly different analyses, but through clerical carelessness the two lots were so shuffled as to make their correct visual separation totally impossible. To outward appearance all rods were identical and, as a matter of fact, the only significant difference was a chromium content of 3 per cent.

The author was approached to devise some rapid, inexpensive means of undoing the damage.

Naturally, the first methods to come to mind were those of conductivity and magnetic characteristics. A glance at a handbook, however, indicated that the resistances of the alloys were so nearly similar that any differences existing in samples 12 in. long by ⅛ in. in diameter would require a complicated vacuum tube amplification system to detect. Even with some such balanced bridge arrangement, the time necessary to measure the resistance of each rod would have been prohibitive when multiplied by a factor of 40,000. Likewise, it was roughly calculated that no confidence could be placed in magnetic permeability variations since some rods in both classes were slightly susceptible to magnetic fields, while others were not. This susceptibility depended more or less upon the structure of the rod as influenced by its drawing, etc.

Finally, the possible electrochemical differences of these alloys came to mind. It is well known that when two dissimilar metals are immersed in a suitable solution, an electrolyte, and electrically connected by a wire, a current will pass between the two. This current makes a complete circuit, the electrolyte forming a conducting medium between the two electrodes, as in Fig. 1. What actually happens, of course, is a chemical change of the metal into a metallic salt whose ions carry the liberated electrical energy in the form of a charge from one metal to the other.

The magnitude of the current resulting from the discharging of ions depends upon the electrolyte and the metals used as electrodes. Thus, one electrode of copper and one of nickel will generate a certain amount of power, but if the nickel electrode is replaced by zinc, for example, the power factor is changed.

After some maneuvering, it was found that the simplest form of voltaic cell, utilizing a welding rod as one electrode and a carbon rod as the other, gave clear indications of a difference between the two types of rods. It is unnecessary to present a detailed account of the search for a satisfactory electrode and an efficient electrolyte, but two points should be mentioned. Many rods were coated

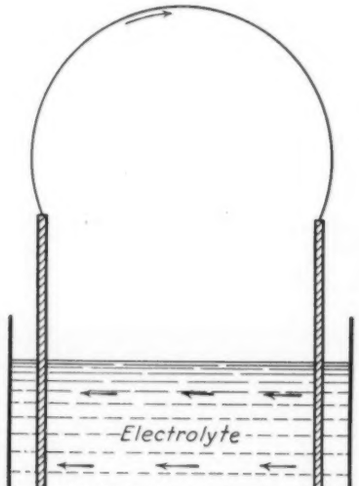


Fig. 1—A simple voltaic cell.

with some chemical substance whose nature depended not only upon the composition of the alloy, but also upon the chemicals to which the rod had been exposed. This latter condition is especially present in plants where the atmosphere may contain welding gases or acid fumes. Thus, any ordinary electrolyte might only serve to indicate the difference between a surface of iron oxide and another surface of copper nitrate. Therefore, it was necessary to use an electrolyte which would rapidly bite through this surface coating and react with the true alloy beneath. A good solution for this purpose was made with hydrochloric acid (44 per cent), distilled water (44 per cent), and nitric acid (12 per cent). This solution was superior to true aqua regia.

The second point was the fact that it was necessary to find an electrode to oppose the welding rods, an electrode which could be left in the solution continually without being chemically changed by the electrolyte. The answer to this problem was, of course, the use of carbon; for while carbon behaves in such an electrolyte like a metal, it takes no chemical part in the reaction and does not erode.

Fig. 2 shows the final set-up. The welding rods, used in sequence as one electrode, were picked one by one

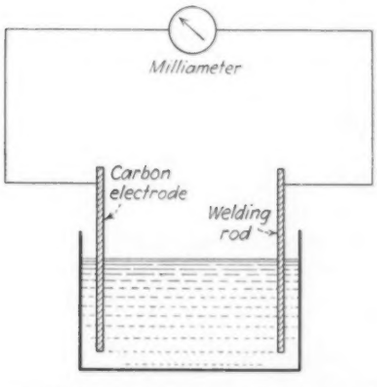


Fig. 2—Voltaic cell using one carbon rod and one welding rod as electrodes. The current produced is read on the milliameter.

from a pile by means of a pair of pliers to the handle of which was soldered a wire connected to one terminal of the milliameter. The time taken for the acid electrolyte to bite through the surface coating of the rod, set up a voltaic cell battery between carbon and alloy, and then register on the meter was slightly less than 2 sec. Once the technique of picking up the rods, dipping them, reading the meter, and discarding them into the correct type became familiar, it was easy to separate better than 1000 rods per hr. To avoid continuation of chemical action between rods and acid, they were thrown into pails of water after sorting.

Although this method of separation is extremely simple, there are three important factors to be kept in mind. First, the depth of the electrolyte should be kept roughly constant if it is desired to detect small differences. As the rods are passed through the electrolyte, they naturally take some

THIS is a report of a brief investigation into the possibility of using the electrochemical differences of alloys as a means of determining certain metallographic properties. The work described here was, unfortunately, not carried to the point where mathematical formulae could be set up, but results appear to indicate the possibility of constructing some electrochemical device to analyze rapidly and inexpensively certain properties of alloys.

of the solution out each time. This lowers the depth and consequently changes the amount of surface exposed to the action of the acid on subsequent rods. Among other things, the output of a voltaic cell depends on the area of electrode surface exposed in the direction of the other electrode. In Fig. 3, where X and Y are two plates of a cell, surfaces A on each are responsible for practically all current produced, while surfaces B take almost no part at all in the reaction, electrically speaking.

Second, care must be taken to put the alloy electrode in as nearly the same position as possible each time. Variation of the distance between electrodes changes the current output, the shorter distances producing the higher currents.

Third, if the electrolyte becomes spattered up onto the handle of the pliers so their contact with the welding rods is a moist one, then this contact becomes a second, smaller cell which produces its own current and upsets previous calculations. Moreover, when the handle is wet, small voltaic cells may be set up between wire and solder, solder and pliers, and wire and pliers.

That this method is fairly rapid must be evident. That it is inexpensive is shown by the fact that the second-hand milliameter used cost $6, the pliers were purchased at a local "5-and-10," the wire was perhaps worth 10c., and the electrolyte, carbon electrodes, containers, etc., probably totaled $2.

Supplementary Investigation

During this work the author was struck by one peculiar fact. Some rods gave different reading at one end than at the other. Because of this it was decided to carry the investigation somewhat further, and accordingly the work was transferred to a well equipped physics laboratory. Samples of several different rods were tested and each gave a different result, as was to be expected. However, a nichrome rod, when used in the cell (in place of a welding rod), instead of producing a current of milliamperes, yielded one of over 2 amp. per sq. in. of surface at a full load potential of 0.3 volt. This extremely high output made easier the task of recording small percentage variations, and so it was decided to experiment almost exclusively with nichrome.

It is probably best to omit many of the interesting facts disclosed during this brief experiment and mention only those which might have a direct bearing on the realm of alloy metallography. For these latter tests a voltmeter and series resistance were added to the circuit so that either current or voltage could be determined separately and with various loads (see Fig. 4). Table I shows some members of the electromotive series of metals with their relative positions. Here the metals furthest apart are the ones between which exists the greatest electromotive force when placed in an electrolyte. On this basis the highest potential difference stands between aluminum and silver, while that between iron and nickel, for instance, is extremely slight. Any metal will replace any other metal below it in the series.

The first interesting point brought out was that a nichrome electrode gave a higher current than proportional amounts of any of its constituent elements. In other words, use of one carbon electrode and one similarly sized electrode of pure nickel, or iron,

or chromium (chromium plated copper strip), produced a smaller current than when combined in alloy form. This superiority of an alloy as an energy producer over any one of its component elements was also confirmed in the case of stainless steel, although it obviously would not hold for all alloys. Now it is already well known that when impurities are present in an electrode of a voltaic cell, local action takes place. Local action is the setting up within a single electrode of one or more tiny voltaic cells formed there by electromotive differences between the predominant metal and the minute amounts of other metallic impurities present (see Fig. 5). In general, this local action erodes the electrode and greatly detracts from its efficiency. For example, commercial zinc in an acid solution dissolves even if no closed cell is formed due to the presence in the zinc of electro-negative impurities such as iron, calcium, or arsenic. In the manufacture of zinc electrode batteries mercury is

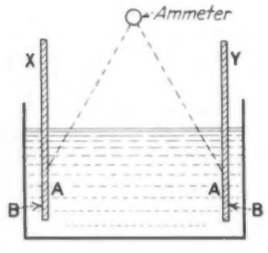


FIG. 3—In a voltaic cell having electrodes X and Y, the surface A produces the most current, whereas surface B has a far smaller effect.

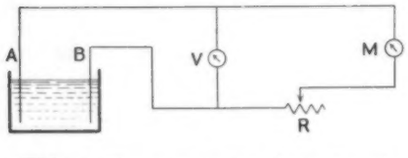


FIG. 4—The set-up using electrodes of carbon and nichrome, A and B. V is a voltmeter, M is an ammeter (0 to 5 amp.), and R is a variable resistance 0 to 10 ohms).

often used to amalgamate the surface on the theory that it acts as a covering for the impurity particles and so prevents formation of small local cells which may tend to feed on the zinc.

To determine whether the actual alloying of metals affected their behavior in a cell, an electrode was made of nickel, iron, and chromium bound together, and present as nearly as possible in the same proportion as in a

Table I

Electromotive Force Series of Metals
(Partial List)

Alumium	1.276
Manganese	1.075
Zinc	0.770
Chromium	....
Iron	0.340
Nickel	0.228
Lead	0.148
Hydrogen	0.000
Copper	0.336
Mercury	0.748
Silver	0.771
Gold	1.079

sample of nichrome. The current produced was about half that given by nichrome, accompanied by vigorous chemical action.

This condition of affairs led the author to believe that during the chemical changes occurring in the nichrome alloy, the crystalline energy of binding thus released might somehow be added to the emf. normally existing between carbon and the elements present in the alloy. Theoretically, the addition to a single-metal electrode of another metal, lower in the electromotive series, should detract from the emf. Thus, if a battery with carbon and lead electrodes gives 1.30 volts, then the addition to the lead of even a small piece of nickel should reduce this potential considerably. When this addition takes the form of alloying, however, the theory does not always seem to hold.

Another test was run in which a nichrome welding rod was bent somewhat in the shape of an M and immersed alone in the acid electrolyte (see Fig. 6). An ammeter was then

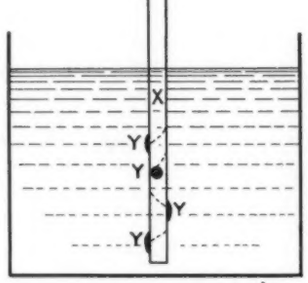


FIG. 5—There is localized action in a metallic electrode, with interaction between the electrode (X), electrolyte, and impurities (Y).

connected across the rod, and surprisingly enough a current was found to flow along the rod. Reversing the leads gave a negative reading on the meter. This polarity effect supported the previous observation of change in current with end used, and it seemed to indicate a rectifying tendency within the rod itself. This effect has been found to exist by the addition of chromium to cast iron or by plating chromium on iron, and is especially evident in arc currents (see *Physical Review*, Dec. 15, 1934).

Although different polarities are frequently used for welding different types of alloys, a study of rectifica-

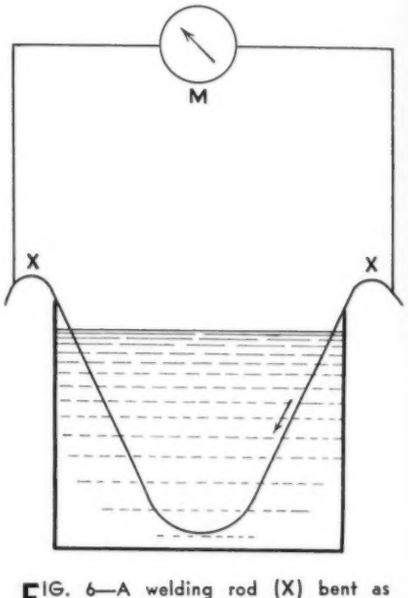


FIG. 6—A welding rod (X) bent as shown and immersed in an electrolyte will show a current flow in meter (M).

tion in various rods, due perhaps to methods of drawing, might well affect welding processes, particularly with respect to the behavior of gaseous ions.

Furthermore, it was determined that this self-generated current could be increased or decreased by heating the rod in a Bunsen flame, by bending, or by hammering. In view of these facts, a straight rod was again used as an electrode in the cell and was subjected to various treatments. When the rod was heated to redness in a Bunsen flame, and allowed to cool, the resulting current changed from a steady direct one to a uni-directional, pulsating one, oscillating from 0 to 2 amp. about once a sec. The rod was then used with alternate bands annealed, as in Fig. 7, and the current became alternating, performing a cycle from 0 to plus 1, to minus

1, and back to 0 in 1½ sec. At first this suggested an alternate polarization and depolarization due to conditions caused on the surface during or after heating, but it seemed improbable inasmuch as the effect persisted until the rod was entirely eroded away.

As in the other case, it was also possible to change the current, and the frequency of oscillation, by bending and hammering.

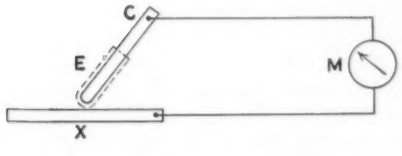
That many of these same conditions could be repeated no matter what the size or shape of the alloy object, was more or less demonstrated as follows: A carbon electrode was wrapped with absorbent material soaked in the electrolyte and allowed to touch a flat sample of metal. The current produced when a circuit was made, as in Fig. 8, varied from one metal to another as with the rods.

AT RIGHT

FIG. 7—Welding rod annealed in bands. Areas (A) heated to redness in Bunsen burner, and areas (B) heated to much lower temperature.

BELOW

FIG. 8—Supplementary test set-up. C, carbon rod; E, electrolyte-soaked material; M, meter; and X, alloy sample.



At this point further research was terminated by circumstances beyond the author's control, but it seems likely that some inexpensive instrument could be readily devised and calibrated to show certain characteristics of metals and their alloys. It is improbable such a device could ever rival the more delicate and accurate analytical methods now used, but it might serve as a rough guide in many an emergency.

Davenport Describes Hardness—Ductility of Austempering Process

IN a recent address before the Science Forum of the New York Electrical Society, Edmund S. Davenport, physical metallurgist of the United States Steel Corp., said "ordinary steel can now be made hard enough to cut glass but yet be so ductile that it can be bent double. Now nearing a stage of practical use, this method of getting 'alloy steel properties' in certain grades of carbon steel, heretofore possible only by means of the more costly alloy steels, may bring to the general public savings of many millions of dollars in small tools and springs, and a wide range of small hard steel products."

Mr. Davenport collaborated with E. C. Bain, also of United States Steel Corp., in the development of this patented process.

"This property of high hardness coupled with ductility," according to Mr. Davenport, "would be particularly desirable in certain tools where the ability to take punishment without breaking is advantageous, as in garden tools, shovels, chisels, dies, and springs. An ordinary shovel of plain carbon steel has been bent almost double without breaking after it was austempered in the laboratory to a hardness considerably in excess of that of alloy steel shovels."

It was pointed out that the essence of the process is the quenching of the steel into a bath of molten substance instead of water or oil, and holding it there for a predetermined period. While held in this molten bath which is capable of withdrawing heat quickly from the steel without combining chemically with the product, the steel undergoes a transformation in a certain time period depending upon the temperature of the bath and the composition of the steel. In general, the lower the bath temperature the higher the strength and hardness and the lower the ductility of the treated steel. Likewise, the lower the bath temperature the longer the time necessary to complete the transformation, although there may be certain exceptions to this rule.

Describing the scientific aspects of this phenomenon, Mr. Davenport said that when steel is cooled from above its critical temperature under ordinary conditions, its grain structure changes from the so-called "gamma" or austenitic condition to the so-called "alpha" or ferritic condition. If cooled slowly, no hardening takes place and the steel is soft. If cooled rapidly as in water quenching, it tends to transform to the hard, so-called "martensitic" condition and may be too brittle for use without a further heat treatment.

In austempering, the steel is quenched in such a manner that the formation of hard, brittle martensite is avoided. Once in the molten bath it undergoes a slower transformation, which when complete, yields a crystalline structure which differs from martensite, the characteristic constituent of fully hardened steel. This newly discovered structure exhibits an unusual combination of high hardness and ductility coupled with improved impact strength.

EDMUND S. DAVENPORT demonstrates that an austempered steel pin is hard enough to cut glass but yet is so ductile that it can be bent double.

At present, austempering of plain carbon steels is limited to sections which can be cooled with sufficient rapidity to prevent transformation during the quench to the austempering bath temperature. If too thick, heat cannot be withdrawn from the steel rapidly enough to cool it to the austempering bath temperature. Experience indicates that the upper limit of thickness of carbon steel which may be successfully austempered probably lies somewhere between ¼ and ⅜ in.

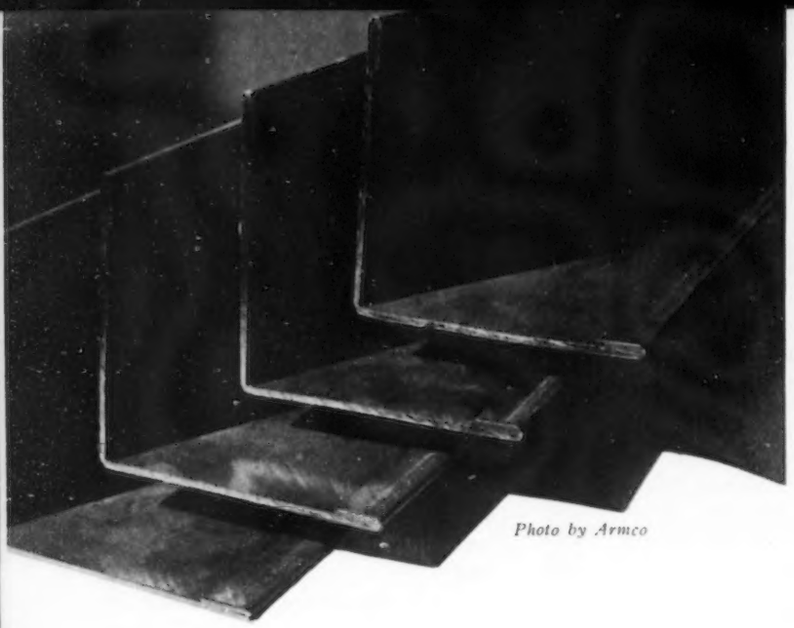


Photo by Armco

o o o

GOOD quality metal results from the full realization of the detrimental influence of molecular hydrogen or hydrogen compounds formed in the steel under pressure.

o o o

Non-Metallic Elements in Steel*

o o o

By T. G. BAMFORD

o o o

IN the Kaiser-Wilhelm Institute, a large number of practical experiments have recently been carried out by P. Bardenheuer which prove conclusively what a devastating effect hydrogen can have upon the properties of steel. It has long been known that diffusion of nascent hydrogen would proceed against a considerable pressure of gas on the side of the metal not in contact with the solution. But, however, it is only comparatively recently that Bardenheuer and Ploum have observed diffusion through cast steel against pressures of 200 to 300 atmospheres. It is only at the present time that the principles underlying the theory have been clearly established. The conclusions which can be drawn from it and the new knowledge which has been obtained is of the utmost importance to the iron and steel maker and user.

*Presidential address before Staffordshire (England) Iron and Steel Institute.

Gases diffuse through metals in the atomic and not in the molecular state. Only those gases which undergo activated absorption by a metal, involving atomization, can diffuse through it. At any rate, in the case of hydrogen and iron, diffusion is a lattice process and the grain boundaries play no part, except perhaps that they provide active centers for absorption and facilitate the entry of the gas. Diffusion results from the successive formation of unstable gas-metal associations, the gas-metal being handed on from one metal atom to another. Whenever it passes into a contraction cavity, a blowhole or non-metallic inclusion it becomes converted into molecular hydrogen, in which form it cannot diffuse and will develop many thousand atmospheres pressure within the metal. The same development of internal stresses will take place within the metal, if for any reason atomic hydrogen, which is diffusing through it or is dissolved in it, is caused to combine with another atom, forming molecular hydrogen, or a hydrogen compound with another element.

Pickling blisters, surface defects on galvanized sheets, scale markings on enameled sheets, hydrogen brittleness after soldering and gas welding are well known examples of faults, traceable to the formation of molecular hydrogen under pressure. If, for instance, steel which has absorbed hydrogen in the pickling bath is allowed to come into contact with molten brass, as is usual in the brazing of steel parts, the sudden increase of pressure due to the heating of the entrapped gas, disrupts through the metal causing intercrystalline fissures through which the molten brass is enabled to penetrate; the defect known as brazing brittleness is the result. Even with low carbon steels, absorption of hydrogen gas from acid solutions causes a sharp decrease in forming qualities, and steels containing 0.90 per cent carbon become quite brittle. Plasticity can, in part, be restored by heating to a red heat, at which temperature ionization of the gas at the metal surface takes place to an appreciable extent and the gas diffuses slowly through the metal, escaping into the surrounding atmosphere.

Since it is only atomic hydrogen which can dissolve in molten steel, and since it is only at high temperatures that molecular hydrogen is ionized or converted into atomic hydrogen at the metal surface, it follows that molecular hydrogen—and the same can be said of other gases like nitrogen—has no solubility at room temperatures and that while it can dissolve at high temperatures, its solubility in steel decreases rapidly with a fall in temperature. The same conclusion can be drawn from the fact that the solution is an endothermic process. The gas taken up in the annealing furnace by steel from gas mixtures containing hydrogen will, if retained in it by rapid cooling, create intense internal stresses with resultant deterioration of properties. Gas taken up in this way has therefore essentially the same influence as gas absorbed in the pickling process. There is this difference, however; the gas can escape if cooled slowly from the tem-

OWEN D. YOUNG, Chairman of the Board, General Electric Co. Drawn by John Frew for The Iron Age.

UNIV. OF MICH.

perature at which it was absorbed and little harm will result, unless the dissolved gas is expelled too quickly.

Behavior of Hydrogen

Of special importance is the behavior of hydrogen taken up by steel in the molten state. In order to investigate this, Bardenheuer made up in the high frequency furnace a series of experimental melts with different carbon contents. After adding manganese and silicon, part of the melts were cast. Before casting the second part, hydrogen was led through the molten steel for 10 min. Castings in the first series were all quiet in the mold, but the castings in the second series were all turbulent and rose in the mold. In all cases the untreated steels forged easily. A mild steel with only 0.07 per cent carbon which had been treated was found to be hot brittle, but heated in the furnace for 5 min. at 2192 deg. F. the brittleness had partially disappeared, while no hot brittleness remained after allowing this specimen to cool to room temperature and further heating to the forging temperature. Similar results were obtained when the red brittle properties were investigated by determining the impact figures at temperatures between 1470 and 1650 deg. F.

Nickel-chromium steel with about 1 per cent chromium and 3 per cent nickel seem to be equally susceptible to damage by hydrogen gas taken up by the molten metal. From melts of this alloy, treated like the straight carbon steels, Bardenheuer prepared forged plates 0.394 in. thick from the first heat and also at forging temperatures of 1832 deg. and 2282 deg. F. The untreated steel was quite sound, but whether forged directly, or after cooling and forging at 1832 deg. or 2282 deg. F., the metal which had been subject to hydrogen treatment showed splinter flaws easily discernible in the plates after nicking and fracturing. From recent results obtained by other workers, it has been shown that the forming properties of steel can be seriously impaired by the influence of hydrogen taken up in the steel melting process. F. Karber and J. Mehovar showed that heating newly rolled rails to 392 deg. F. or 1112 deg. F. for 1 hr. effected a very considerable improvement of ductility as measured by tensile and transverse tests. Additional experiments carried out with a Thomas steel showed that an anneal of only 1 hr. at 392 deg. F. raised the elongation from 12 per cent to 18 per cent and the deflection from 15 per cent to 34 per cent. At the same time the hydrogen content was reduced from 3.25 per cent to 0.48 per cent. Somewhat similar improvements were obtained with a Siemens Martin steel.

On the basis of his experience, the steelmaker lays great weight on a sufficiently long boil since he knows that, failing this, a steel with bad properties will result. It is particularly true that a brittle steel can only result when large quantities of strongly rusted scrap have to be worked in and when a high carbon content has to be held, and a long boil must be avoided. Rust differs from pure iron oxide essentially through its content of occluded hydrogen and, in fact, a 1 per cent addition of rust introduces 883 cu. ft. of hydrogen per ton of steel, or measuring the gas at normal temperature and pressure, a volume equal to 20 times the total volume of the steel.

Unlike hydrogen, carbon monoxide is almost insoluble in iron and steel. A lively boil is therefore effective in driving out the greater part of the hydrogen from the bath. The carbon monoxide, bubbling through the bath of metal, creates in the bath itself and in the atmosphere above it an atmosphere of carbon monoxide in which the partial pressure of the hydrogen is practically zero, so that the higher pressure of this gas in the steel bath as against the small partial pressure in the surrounding atmosphere induces a tendency for hydrogen to pass from the former into the latter. In this way the dissolved hydrogen is slowly removed from the steel bath, and whether it has passed into it at some stage of the process from the fuel gas or was already a content of some part of the materials charged into the furnace, it should be possible to remove it if a sufficiently long boil is possible. Consequences very detrimental to the steel, however, can result from the introduction of hydrogen additions made to the finished bath at a time when no further boil is possible and the injurious gas cannot be removed.

For example, a steel is often spoiled by the addition at the finish of the heat of damp lime or ferroalloys containing hydrogen. Most ferroalloys hold considerable quantities of this gas, which is taken up by the bath if the temperature is high. If the content in the steel exceeds a certain value, even a well deoxidized steel will become restless and rise in the mold. This is found even with transformer steels containing 4 per cent silicon, if the steel is alloyed with ferrosilicon in the ladle. It is therefore strongly to be recommended that, before adding ferroalloys to the steel bath, all gas should be expelled from them by heating. Almost all of the hydrogen can be removed from low carbon ferrchromiums by treatment at 1472 deg. F., but high carbon alloys and ferrotungstens require higher temperatures. Surface blisters, which are essentially due to hydrogen, will completely disappear if raw limestone is used instead of the burnt product. Burnt lime will take up, on standing, 10 per cent or even larger quantities of water and, in this way, introduce large quantities of hydrogen into the bath. The unburnt limestone, on the other hand, carries very little moisture, and because of its content of carbon dioxide further stimulates the boil and degasing of the bath.

Summing up, it may be said that whether hydrogen be introduced into steel in the pickling process, while the steel is in the annealing furnace, or during the processes of melting, in all cases its detrimental influence is due to the formation of molecular hydrogen or hydrogen compounds formed in the steel under pressure, thus weakening the intercrystalline cohesion of the grains. Many unexplained defects in steel and cases of poor quality metal are due to this cause. The results obtained by the research workers should be sufficient warning to attach more importance to the content of hydrogen in steel, not only from the point of view of steel making, but also of its further treatment in the mill and engineering workshop.

J. & L. Publishes Book On New Continuous Mill

THE Jones & Laughlin Steel Corp., Pittsburgh, has published an illustrated book, bound in stiff covers, on its new continuous sheet and strip mill. The text is a description of the mill and the process of rolling. The book contains many photographic illustrations and reproductions of artists' paintings in color.

Correction

IN THE IRON AGE of Feb. 3, 1938, on page 86 L. J. St. Clair, of the Carboloy Co., Inc., Detroit, was misquoted in connection with an address before the Bridgeport chapter meeting of the American Society of Tool Engineers.

Our news item quoted Mr. St. Clair as recommending carbontetrachloride as the best agent in brazing cemented-carbide tipped tools. What he did say was that carbontetrachloride was recommended as the best agent in cleaning.

Current Advances in Power Drives

AMONG the items described and illustrated in this review are a wide range variable-speed drive employing V-belts, a synchronizing mechanism for dual drives incorporating a differential, several flexible coupling designs, fiber lagging to increase the diameter of flywheels and to make the belt pull more effective, adjustable pitch V-belt sheaves, a V-belt fastener and a vulcanizer and belt hooks for flat belts. Among the newer material handling equipment may be found a lightweight electric hoist, two forms of lift trucks, oil proof tires for industrial trucks, an improved belt conveyor carrier, spring supported rollers for heavy duty service, and two improved methods of handling scrap in the yard. Next week's review will be devoted to new forms of finishing equipment and new finishes for metal products.

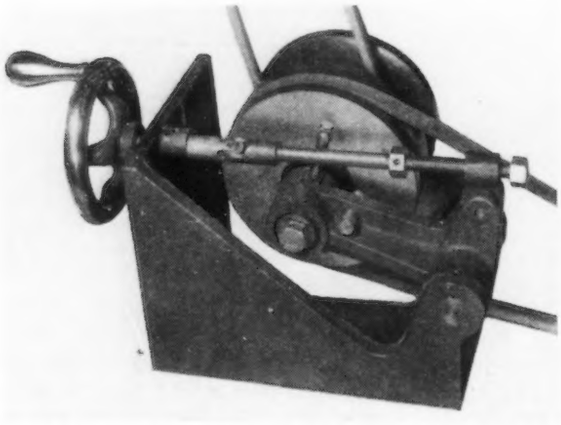
AN ingenious development in variable-speed drives is a V-belt type, known as the "Speedmaster" and made by the *Speedmaster Co.*, Minneapolis. This company is a division of *Continental Machine Specialties, Inc.*, and the unit was originally designed for use with that firm's "Doall" contour sawing machine. It is now being offered for a variety of machine drives.

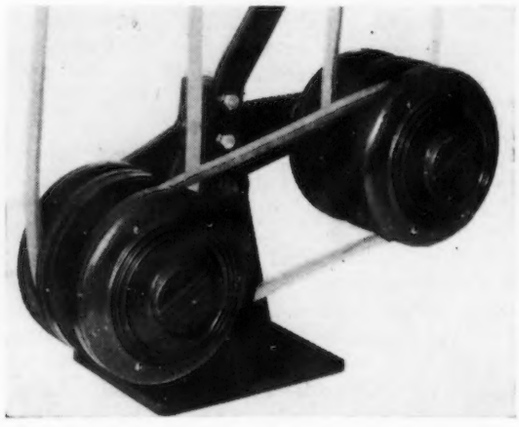
The Speedmaster is being made in a single and double unit, the former giving a speed range up to 6:1 and the latter up to 40:1 and even higher. Both employ standard V-belts of any make. Chief feature is the bakelite-faced pulleys having two outside fixed members and a double cone central member that is free to move laterally between them. Extreme variations in small and large pitch diameters is made possible through the use of interlocking slots in the pulley faces, allowing the V-faces to be brought close together on one side (the belt riding high) and wide apart on the other (the belt being on the minimum pitch diameter).

In the single pulley type, a handwheel is used to vary the location of the pulley bearing stud, and the two belts having fixed driver and driven centers find their own pitch diameters on each pulley half. In the double pulley type, the handwheel varies the position of a centrally pivoted rocker arm and the belts seek their own centers on the two split pulleys. Pulley sizes range from 6½ in. outside diameter down to 3½ in. The motor is mounted rigidly on the case and may be anything from a fractional hp. up to 4 or 5 hp. The output shaft may be direct connected or an output pulley may drive through another V-belt. The company engineers special designs for specific applications.

Differential Drive

For use in automatic speed control where synchronization of two or more machines is required or the maintenance of uniform peripheral winding or unwinding speeds, a differential accessory is being furnished by the *Reeves Pulley Co.*, Columbus, Ind., for





THE "Speedmaster" variable-speed drives are made in single (6:1) and double (40:1) units. They employ V-belts running in split pulleys faced with bakelite and having fixed outside cones and a floating double cone in the middle.

and Material Handling Devices

application with its variable-speed transmission. The unit, known as model MDB-3, is similar in principle to the differential in a motor car. Within a housing are mounted three parallel shafts operating in oil as illustrated. The central differential shaft is connected by roller chain and by gears of 1:1 ratio to the other shafts. This same shaft is also coupled to the speed changing screw of the Reeves transmission.

When shafts 1 and 3 are driven in the same direction at the same speed (each being connected to the driven machine or machines) shaft 2 stands still. When the speeds of the driven shafts vary, this variation is transmitted to shaft 2, which speeds up or slows down the transmission until synchronous speed is restored. Infinite range in speed variation is possible by connecting shafts 1 and 3 to the constant and variable speed shafts, respectively, of the transmission. The differential may also be used as primary driving equipment. Overall dimensions 8 in. wide, 11 in. long and 6⅝ in. high.

Flexible Coupling Designs

Through the use of a removable jaw ring that can be shifted axially,

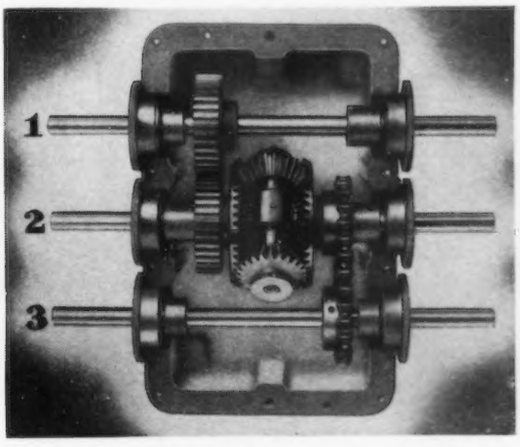
By FRANK J. OLIVER
Associate Editor, The Iron Age

° ° °

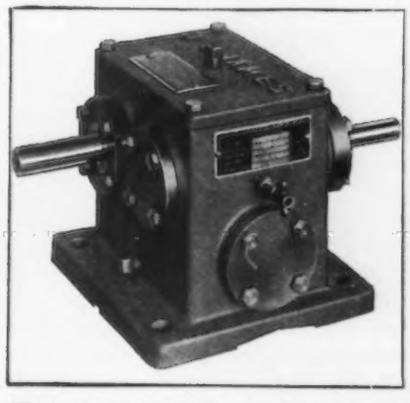
a disconnect feature is incorporated in the type WQ flexible coupling made by the *Lovejoy Flexible Coupling Co.*, 4979 West Lake Street, Chicago. The design is built around the L-R principle which has been in use some years and which employs free-floating load cushions to absorb shock. The removable ring rides on a pilot land ⅛ in. deep and in the driving position is bolted by capscrews to the adjacent coupling hub flange. By leaving a gap 3/16 in. between the cushions and the jaw body, it is possible to pull the jaw ring over (to the left in the sketch) so as to clear the pilot by 1/16 in. This change is made by removing the capscrews and using them as pullers from the other body. It is not necessary to remove the load cushions or the retaining band. The clearance provided is ample for rotating either half of the coupling or for radial removal of connected shafts. Cushions may be Metalflex, a brake lining material for shock load conditions; oak tanned leather; or Multiflex, a rubber ruck fabric. The type WQ couplings are made with shaft bores from 1½ to 14 in. and from 2 to 2000 hp. rating at 100 r.p.m.

The *Torrington Mfg. Co.*, 90 Franklin Street, Torrington Conn.. has designed a new spline type flexible coupling for use in gun type oil burners. The sleeve end of the coupling has a sliding fit on the wheel hub and when assembled, covers the hub setscrew, preventing it from working out. Power is transmitted from the blower wheel by four splined grooves engaging ribs in the sleeve of the coupling. Chief advantages claimed for this coupling are: Maximum flexibility with a minimum of parts, simple assembly, elimination of end thrust, and provision for using short-shaft motors.

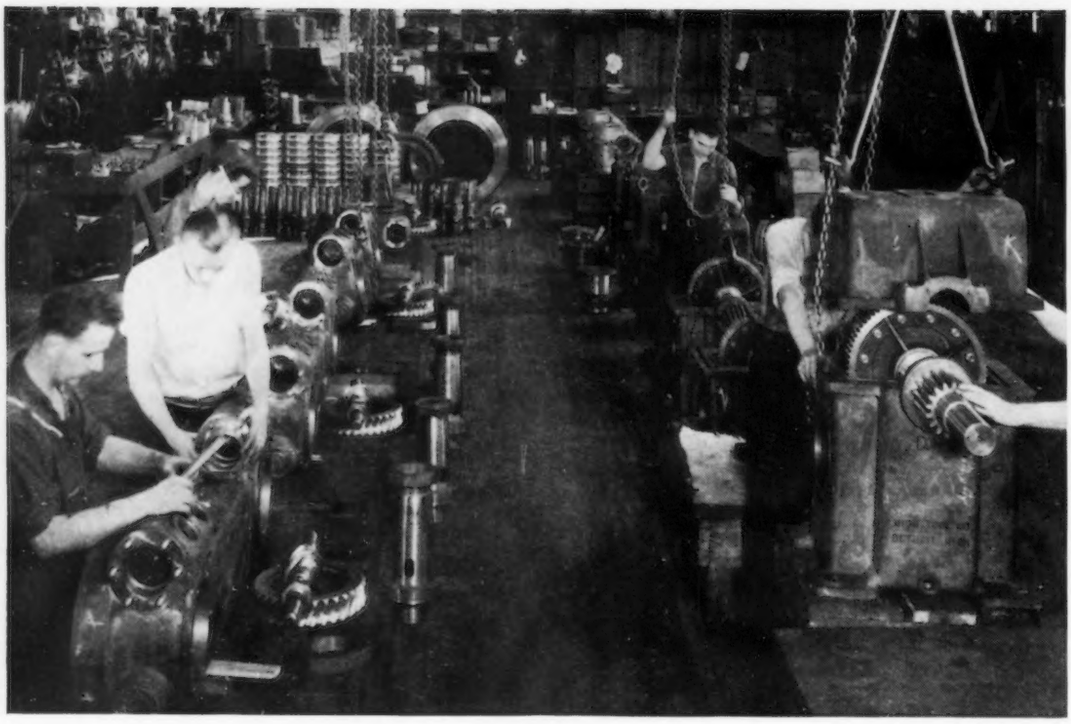
Henry Engineering Co., Moline, Ill., has developed a unique flexible coupling for low power applications. It is made in the form of a cylinder, and the material is either rubber or neoprene, du Pont's chloroprene rubber. In either end of the cylinder are openings of circular shape with one side flattened, designed to fit shafts of the same general cross-section. With this arrangement, it is possible merely to insert the shafts in the openings and still secure a drive as the



SYNCHRONOUS speed of two output shafts is assured with this Reeves differential drive in connection with its variable-speed transmission.



THE new D. O. James double worm gear reducers are made with speed ratios ranging from 30 to 3600 to 1, having torque capacities at the slow speed shaft from 40 to 400 in.-lb. Steel worms are used with bronze worm wheels, with the shafts mounted on Timken bearings.



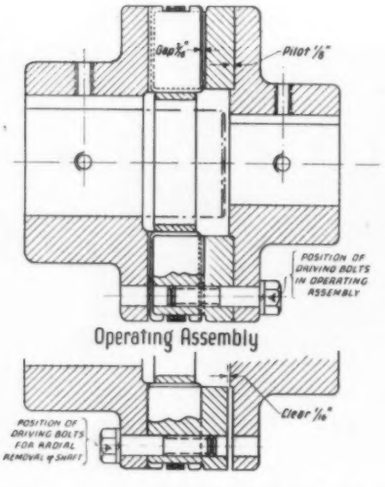
o o o

TO expedite assembly of "Cone" geared speed reducers, Michigan Tool Co. has installed a progressive assembly line at its plant in Detroit. Cone gearing has an hourglass type of worm with entering tooth action tending to wedge oil ahead of the tooth and thus reduce friction and wear.

o o o

flat sides do not require setscrews or attachments of any kind.

Wear-resisting inserts are molded into the cylinder to take the driving force. These inserts are generally U-shaped in cross-section, and the opening is also circular with one side flattened to fit the shaft. These inserts are molded into position and, in addition, corners of the inserts are crimped to give an even better bond between them and the rubber or neoprene. With this design the coupling will withstand considerable torsional strains without breaking down, and will return to initial or zero position as soon as the strain is released.


Gap 1/16"
Pilot 1/8"
POSITION OF DRIVING BOLTS IN OPERATING ASSEMBLY
Operating Assembly
Clear 1/16"
POSITION OF DRIVING BOLTS FOR RADIAL REMOVAL of SHAFT

THE L-R flexible coupling type WQ is a load cushion design that embodies a simple disconnect feature.

Where the coupling may come in contact with oil, the cylinder is fabricated from neoprene, which maintains its properties virtually unchanged even after extended immersion in oil. Neoprene also resists the deteriorating effects of many chemicals, heat, sunlight and aging.

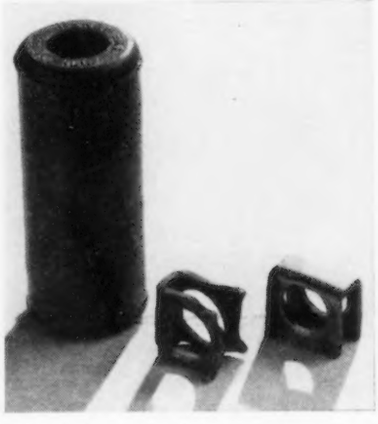
This patented coupling is available in lengths from 1¼ to 4½ in. and pin sizes from ¼ to ¾ in.

Ball and Roller Bearings

Since bearings are such an integral part of an industrial drive, mention is made here of two new series of precision bearings made by the *Norma-Hoffmann Bearings Corp.*, of Stamford, Conn. Known in the ball bearing series as type WIR and in the cylindrical roller bearing series as type WIR-L, these bearings feature the use of a wide inner ring of double-row bearing width, in combination with an outer ring of single-row width. Designed primarily for opposed mounting in electric motors and similar applications, the wide inner ring insures a better seating on the shaft than a single-row ring. In many applications, it is not necessary to employ locknuts, and the elimination of threads on the shaft permits a larger shaft extension diameter for a given bearing bore, besides avoiding weakening of the shaft by threading. The WIR ball bearings are available in the medium metric series from 25 to 55 mm. bore, whereas the cylindrical roller bearings with one-lipped outer ring are available in the medium metric series from 30 to 130 mm. bore.

Belt Drive Accessories

Rockwood Mfg. Co. of Indianapolis is offering a new fiber lagging to increase the diameter of pulleys and flywheels and at the same improve the belt pull at reduced tension. Increasing the diameter of the driven pulley permits increasing the size of the motor pulley and results in higher belt speed. This means that for the same horsepower, the belt need not be run so tight or for the same tension will transmit greater horsepower. Furthermore, the fiber suface, it is claimed, will transmit 50 per cent more power than cast iron and often in-



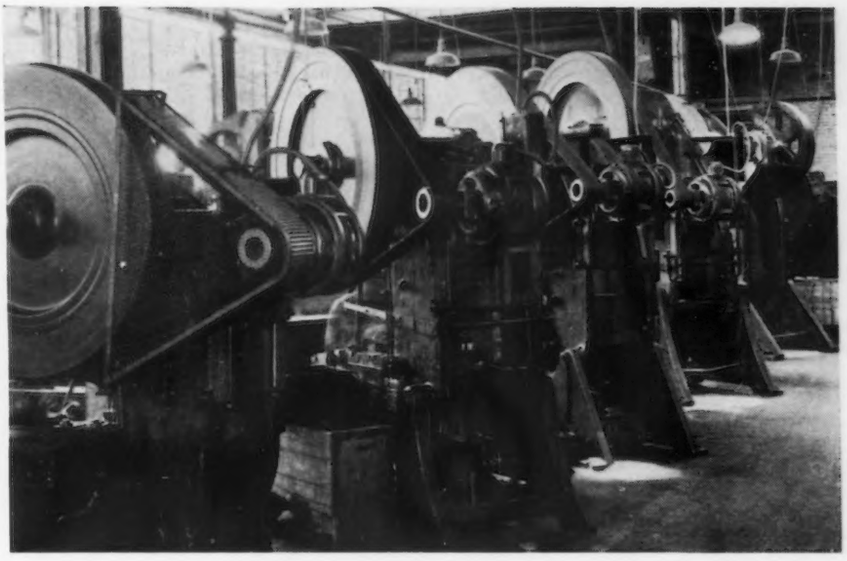
FOR light drives, the Henry Engineering Co. offers a cylindrical coupling made of either rubber or neoprene.

creases the output of the driven machine 10 per cent or more.

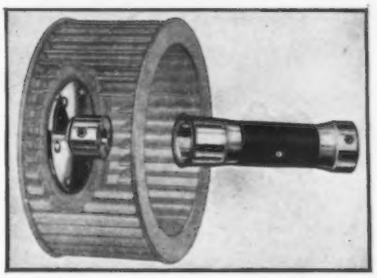
Rockwood fiber laggings are made of the same material as Rockwood paper pulleys, namely, compressed end grain fiber belt. The laggings are supplied in any width and up to 72 in. in diameter. They are applied by clamping on the wheel rim with a simple fastener.

For joining C-section V-belts of fabric core, cross-weave construction, the *Flexible Steel Lacing Co.*, 4642 Lexington Street, Chicago, is offering a fastener that includes a double rocker pin supported in bronze bushings and metal end plates that hold the belt ends without materially weakening the belt or bulging its sides. The rocker pin is hardened alloy steel, and the end plates are shaped so as not to touch the pulley. This design was originally developed for car lighting and air conditioning drives on railroad passenger cars.

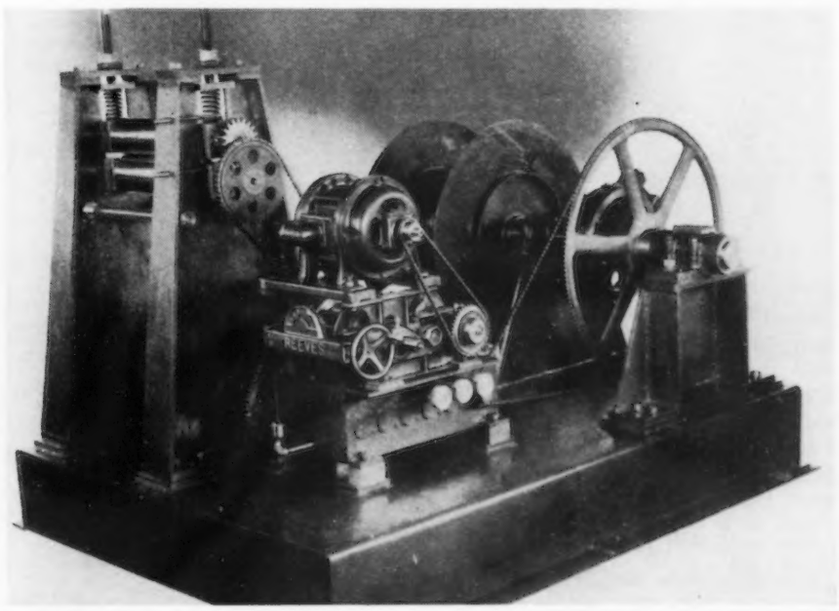
Allis-Chalmers Mfg. Co., Milwaukee, has just announced a new series of two-groove, adjustable pitch diameter, texsteel V-belt sheaves for a speed variation up to 33 per cent on any driven unit where the load does not exceed 3 hp. They are now available in three sizes of 2 to 3 in., 2.5 to 3.5 in., and 3.5 to 4 in. variations, respectively. The pitch diameters on these sheaves are easily changed by stopping the motor, relieving the belt tension, releasing the Allen hollow head locking screw and turning the adjustable plate in or out to the desired pitch diameter. These sheaves are furnished complete with a wrench and a circular calculator showing directly the speeds of the driven unit. These sheaves carry many improvements in construction. The stationary part of the hub is cast integrally around the steel plates and the movable portion of the hub is similarly constructed with sufficient material to form an external brace on the outside plate, thus assuring a smooth, true-running sheave at all times. This company has also added an intermediate diameter texsteel sheave to its single-groove, adjustable pitch diameter series. These also have a speed variation of 33 per cent for ratings up to 1½ hp.



ROCKWOOD fiber lagging on the flywheels of this battery of punch presses increases the belt speed, adds to the press capacity and at the same time reduces required belt tension.



DESIGNED primarily for gun type oil burners, the Torrington flexible coupling is driven by four spline grooves in the wheel hub, the setscrew of which is covered by the assembly.



REEVES variable speed transmission synchronizing the operation of a winding reel and a pair of pull-out rolls drawing strip through an annealing furnace.

A large number of belt hooks purchased never find their way to a belt, but are lost off cards or wasted in short leftover ends. To offset this loss, *Armstrong-Bray & Co.*, 304 N. Loomis Street, Chicago, has introduced a new method of carding their "Wiregrip" belt hooks which they claim keeps each hook in exact position, speeds the loading of lacing machines, assures alinement and prevents the waste of short ends cut from cards of hooks. The hooks are carded first in the usual manner and then a die cut slotted card is forced down over the bent humps of the hooks, thus supporting each hook at four points instead of two. The desired number of hooks can be cut off with a pocket knife or scissors.

Rubber Belt Vulcanize

A comparatively light weight portable vulcanizer designed specifically for fabric or rubber belting service

AT LEFT

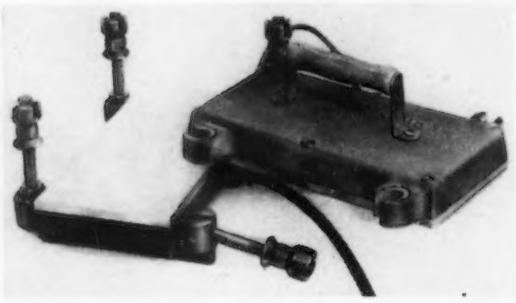
THE Alligator V-belt fastener has a double rocker pin construction.

o o o

AT RIGHT

THE Ton-Tex rubber belt vulcanizer has both upper and lower platens electrically heated. Castings are aluminum to reduce weight.

o o o



o o o

AT LEFT

AN additional reinforcing card prevents loss of hooks on "Wiregrip" belt hook cards and assures alinement during machine lacing operations.

o o o

has been placed on the market by the *Ton-Tex Corp.*, 129 W. 22nd Street, New York. Its weight of 36½ lb. permits the belt to be vulcanized either at the bench or at the machine, and it may be suspended by its handle from a chain hoist or other lifting device. The unit consists essentially of an upper and a lower platen, both electrically heated so as to reduce the vulcanizing time. The main castings are aluminum alloys. In operation the upper platen is swung edgewise off the lower, a single permanent bolt acting as the fulcrum. After the lapped belt ends with cement applied are laid in place, the upper platen is swung back into position and clamping pressure applied by four nuts which may be turned either by wrench or screwdriver. Capacity is up to 7-in. belts in one operation or 10-in. belts in two operations. It takes 30 min. to bring the vulcanizer up to heat and a built-in thermostat keeps the operating temperature within its proper range. The unit operates on either A.C. or D.C. circuits.

Material Handling Equipment

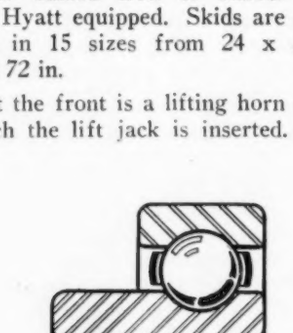
THROUGH the use of roller chain, heat-treated, cut alloy steel gears, nickel steel load shaft, and a train of only two gears and pinions, the designers of the "Budgit" electric hoist have been able to bring the weight down below that of an equivalent hand-operated chain hoist, it is believed. This hoist, made by the *Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc.*, Muskegon, Mich., has 500-lb. lifting capacity and weighs only 58 lb. It has a lifting range of 10 ft. or more and the distance between the upper hook and the load hook is only 16 in. in the up position. Lifting speed at capacity is 17 ft. per min.

Other mechanical features of the hoist are one-hand control, safety stops to prevent overtravel in either direction, a spring cushioned load hook, a safety device that prevents overloading the hoist more than 10 per cent, and control of lowering either under power or by gravity.

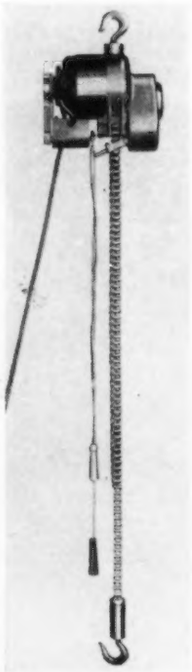
Lift Trucks

Semi-live skids are being used in conjunction with a lift jack in the new Barrett "Jackit" system, made by the *Barrett-Cravens Co.*, 3255 W. 30th Street, Chicago. The skids have steel bound construction, with maple top boards either ⅞ or 1⅛ in. thick. At the front are welded legs and at the back a pair of 9-in. diameter wheels, either chilled iron or rubber tired and Hyatt equipped. Skids are available in 15 sizes from 24 x 36 to 36 x 72 in.

At the front is a lifting horn under which the lift jack is inserted. This



THE Norma-Hoffmann WIR series ball bearings with double width inner race is also made in a straight cylindrical roller type designated as series WIR-L.

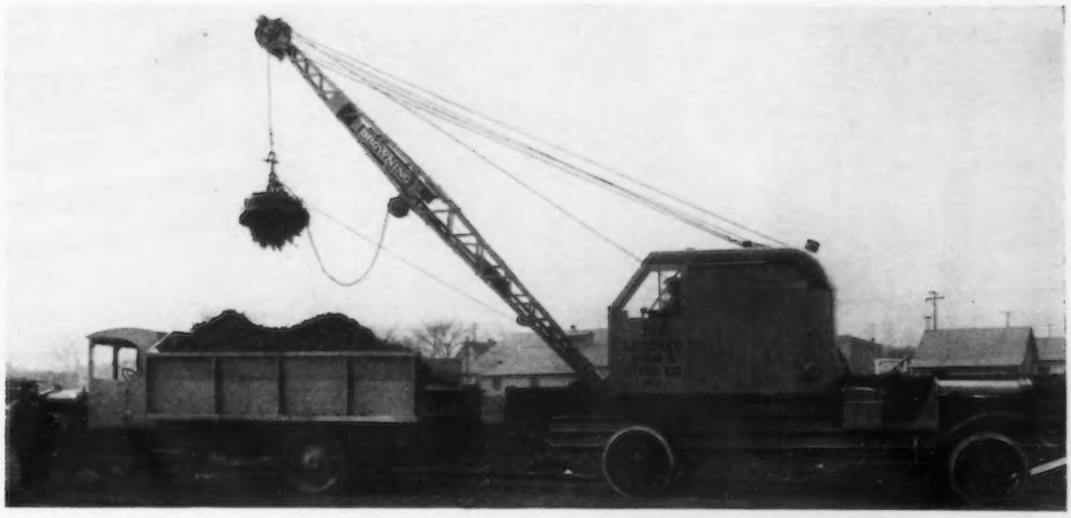


THE "Budgit" electric hoist is of 500 lb. capacity and weighs only 58 lb.

o o o

THIS Browning truck crane shown handling scrap has a magnet energized by a generator mounted in the truck cab. This mobile unit will also handle material with a hook block or clamshell bucket.

o o o



separate unit also has 9-in. wheels, Hyatt equipped for easy pulling, and has a handle that is normally kept in the up position by a strong spring. A downward motion of the handle lifts the skid legs clear off the floor, a positive latch holding it locked in this position. To drop the skid, the towing handle is lowered toward the floor, releasing the latch and allowing the load to be lowered by hand. This jack lift weighs 64 lb. and will serve from four to 25 skids. A number of special skid superstructures are available for special-purpose handling.

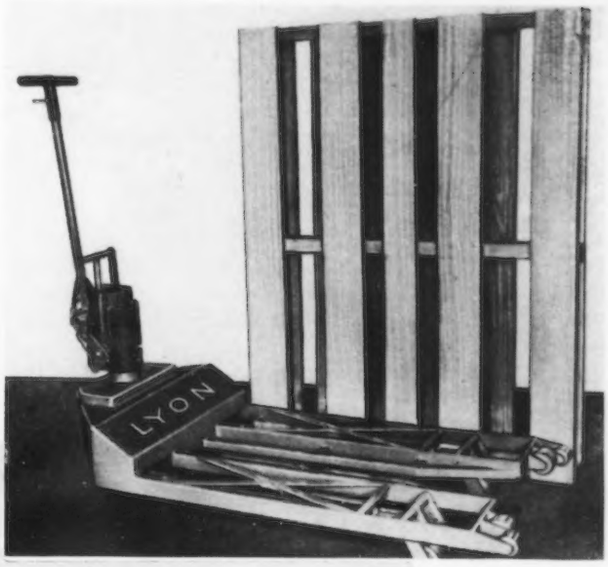
SHOCK absorbers. This spring mounted heavy-duty Mathews roller conveyor is typical of the live roller conveyor tables being used in the newest continuous sheet mills. This particular unit is for the piling unit just beyond the roller leveler. The springs absorb the impact of the moving sheet.

o o o

AT RIGHT

THE Lyon hydraulic pallet lift truck is designed to be pushed between the upper and lower boards of double-faced pallets, ordinarily handled by power fork tiering trucks.

o o o

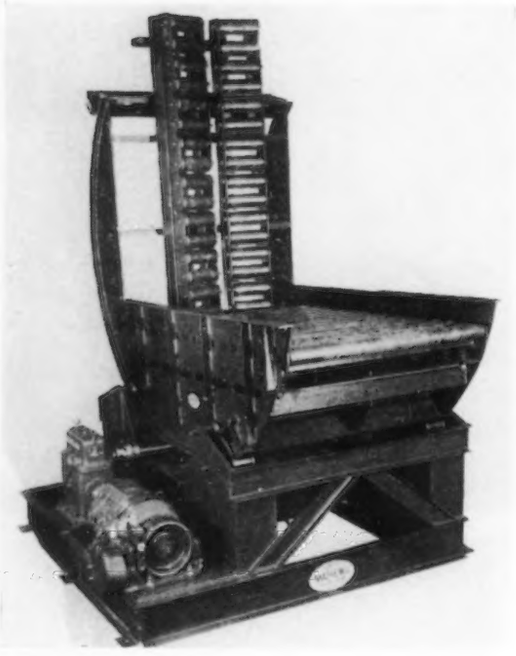


AT LEFT

THE independent jack lift will serve as many as 25 live skids in the new Barrett "Jackit" system.

A hydraulically actuated hand lift truck has been designed for use with double-faced pallets originally developed for use with power fork tiering trucks. This device is made by the *Lyon Iron Works* of Greene, N. Y., and has the standard hydraulic lifting mechanism regularly supplied by this company. The platform of this new truck is U-shaped, like power fork trucks, and carries two sets of rollers at the end of each fork, besides two pair of lifting rolls that actually carry the load. These auxiliary rollers merely facilitate pushing the fork platform between the upper and lower boards of the pallet.

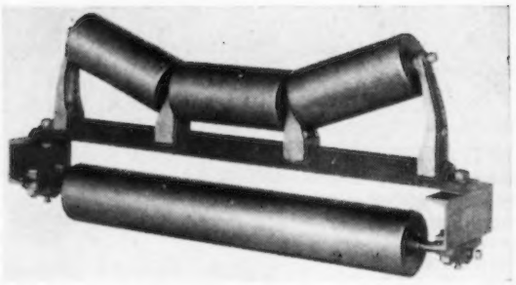
Pallets must be constructed with a minimum opening between top and bottom boards of 3¾ in. and the minimum opening between the end boards should be 6½ in., and end boards 6 in. wide. This construction permits the load carrying wheels to be lowered (by hydraulic means) through the openings between the bottom boards and thus touch the floor. The truck illustrated is rated at 4000 lb. and has a lift of 3 in. Platform is 48 in. long



AT LEFT

MATHEWS CONVEYER CO. is also incorporating spring mounted conveyor rolls in upending devices for strip steel coils. This particular unit was designed to handle coils weighing 18,000 lb. Rollers are 4¼ in. diameter, have a load rating of 4000 lb. and the coil springs are compressed to 2000 lb.

o o o



AN inexpensive ball-bearing belt idler for carrying moderate loads of semi-abrasive materials is announced by the Jeffery Mfg. Co., Columbus, Ohio. It is made for belts from 14 to 36 in. wide. Its ball bearings have a cork seal within a labyrinth dust cap. Pulleys are 4-in. welded pipe with steel gudgeons in the ends connected by steel tubing, which prevents the loss of grease into the pulley proper. Shafts are ⅝-in. seamless tubing.

AT RIGHT

THIS new type tong grip, made by Smith Devices, 2245 N. 12th Street, Philadelphia, is designed for handling plates, angles, channels, I-beams and H-columns.

o o o

and 30 in. wide. Other sizes are also made. Frame side bars are of high carbon steel.

There are two front wheels 7 in. in diameter, equipped with Timken bearings. The rear wheels are 3¼ in. diameter by 3 in. face, equipped with ball bearings so as to pull easily under heavy loads.

B. F. Goodrich Co., Akron, Ohio, is introducing a new industrial tire especially compounded to resist the action of animal, vegetable and mineral oils, to be known as "Oil Pruf." Tires of ordinary construction, when subject to oils, disintegrate and become soft and spongy. Under such conditions, they are subject to rapid tread wear, cutting and chipping. Tests carried on in steel mills indicate that these new tires retain their original physical properties approximately 30 per cent longer than others tested in the presence of oils and similar rubber solvents.

The company has also developed an improved Universal tire compound that gives 10 per cent better tread wear in normal service, and 65 per cent better where cutting and abrasion are severe. Tear resistance has been improved 10 per cent and adhesion of the tire to the metal base is 35 per cent better.

Belt Conveyors

A light weight, rigid truss-type frame supported on two parallel pipes instead of conventional structural steel are features of a new belt conveyor carrier made by the *Stephens-Adamson Mfg. Co.*, Aurora, Ill. Carrier brackets are clamped to the pipes by U-bolts and can be shifted at will. An ingenious rocker type of mounting permits the carrier to tilt in either direction with the travel of the belt. In this way, even a reversible direction belt is centered on the carriers without the use of guide rollers. Sealed cartridge type ball bearings are employed to reduce maintenance.

Scrap Grapple

A new type of grapple with independent action of its tines has been developed by the *Owen Bucket Co.* of Cleveland for particular use in handling scrap iron and steel. The grapple is suspended from a hoist boom in the usual way, and in closing, the tine that encounters the least resistance penetrates deeply into the material and anchors. The other three tines follow in the same order with a powerful gathering action, like that of a giant hand. Small scrap, busheling and stove plate are picked up in grabs so large that the grapple is far from closed; yet there is practically no spillage, it is claimed. The grapple has also been used for handling pigs of non-magnetic spiegel iron. It is designated as type RA grapple.

Illinois Found Least Affected By Strikes

CHICAGO.—Illinois, third state in the number of gainful workers, continued to maintain its favorable record as the lowest among six leading industrial states in the number of man-days lost in labor strikes during 1937, according to the Illinois Manufacturers' Association. The figures for the various states for the first nine months, ending Sept. 30, follow: Michigan, 3,060,390; Pennsylvania, 2,427,348; New York, 2,073,276; Ohio, 1,666,456; California, 1,104,477; Illinois, 1,096,884.

The idleness in Illinois resulted in an estimated loss of $4,914,040 in wages. The largest number of man-days lost took place in August when a state-wide strike of coal miners was in progress. Illinois as well as other states was affected during May and June by the strike in the steel industry.

New System Eliminates Stresses In Welding High-Pressure Piping

By C. J. HOLSLAG
Chief Engineer, Electric Arc Cutting & Welding Co., Newark, N. J.

THE Public Service Electric & Gas Co., Newark, N. J., has let a contract, on which work is now in progress, to the United Engineers & Constructors, Inc., Philadelphia, for the improvement of the power generating facilities of its Essex plant. A great deal of high pressure piping is involved in this project and a method of electric arc welding which includes preheating and normalizing of the piping welds is being used.

While preheating for certain classes of work has been known for years to be a way of obtaining better and special physical properties of the weld, its application by this method is believed to be new. Electric welding has more or less prided itself on its ability to weld mild steel without such previous preheating, but the introduction of alloys, especially the high strength alloys used in modern power pressure piping, require for best results definite temperatures at which the welding should begin and end, and a further raising of the temperature to the desired normalizing point.

This is being accomplished on the Public Service job with specially arranged coils of wire on both sides of the weld, through which coils 60-cycle current is fed at predetermined amperages according to the size of pipe. The heat put in by these coils is at a lesser cost than by the electric arc, and it is observed, of course, that the preheat reduces by that much the amount required from the arc source. The pipe is heated by hysteresis and eddy current losses, first to the preheating temperature, and after the weld is made to the higher desired temperature by the same coil arrangement and held there as long as required for the best grain structure. These temperatures are under pyrometer control, and by means of taps and switching arrangement can be held at any level and for as long as desired. There is an inherent safety factor at the high temperature due to the loss of magnetism in the pipe or other ferrous material being acted upon. For lower temperatures a table has been worked out with voltage accurately specified. In addition, visual and recording pyrometer readings are used together with a record of the current and voltage.

This system not only allows welding to proceed without change of location or connections to the heating coils, but also permits caulking and peening and any other necessary mechanical work without hindrance. Reheating, if desired, is, of course, feasible.

The solution by this system of the problems of heating in connection with the welding of alloy steel pipe is said to be complete. The Electric Arc Cutting & Welding Co., has obtained rights from the inventors to promote its use and is the exclusive licensee. It is designated by the Electric Arc Co. as the gradient system of welding, and is applicable also to the fabrication of boilers and pressure vessels and the like and to building and bridge construction.

WELDING of high-pressure steam piping at the Essex station of the Public Service Electric & Gas Co. By means of coils of wire on both sides of the weld, the pipe is preheated and after welding is normalized, without loss of raised temperature and with the unchanged coils, to assure less grain structure.

Steel Construction Convention Oct. 10-14

DIRECTORS of the American Institute of Steel Construction have selected French Lick Springs, Ind., for the 1938 convention to be held Oct. 10-14, according to an announcement by V. G. Iden, institute secretary.

The committee making the decision included John J. Duffy, Duffin Iron Co., Chicago; Lawrence McKinney, James McKinney & Son, Albany, N. Y., and L. C. Anderson, Nashville Bridge Co., Nashville, Tenn.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources.

	January 1938	December 1937	January 1937	Twelve Months 1936	Twelve Months 1937
Steel Ingots: (gross tons)					
Monthly output[a]	1,732,266	1,472,241	4,724,894	46,807,780	49,507,766
Average weekly output[a]	391,031	333,086	1,066,567	895,329	949,516
Per cent of capacity[a]	29.14	25.36	81.43	68.36	72.39
Pig Iron: (gross tons)					
Monthly output[b]	1,429,085	1,490,324	3,211,500	30,618,797	36,611,317
Raw Materials:					
Coke output[c] (net tons)	.....	2,996,525	4,629,532	46,275,200	52,362,098
Lake ore consumed[d] (gross tons)	.....	1,916,588	4,694,312	44,639,318	53,996,076
Castings: (net tons)					
Malleable, production[e]	.....	27,784	53,638	571,696	602,278
Malleable, orders[e]	.....	19,753	54,070	576,334	549,972
Steel, production[e]	.....	41,537	89,782	805,691	1,019,896
Steel, orders[e]	.....	27,024	115,150	909,080	877,459
Finished Steel: (net tons)					
Trackwork shipments[a]	3,135	3,804	7,246	68,813	92,121
Fabricated shape orders[f]	.....	99,070	153,806	1,609,016	1,628,641
Fabricated shape shipments[f]	.....	108,396	99,934	1,660,570	1,548,205
Fabricated plate orders[e]	.....	27,463	41,419	484,036	428,884
U. S. Steel Corp. shipments[g]	518,322	489,070	1,149,918	10,784,273	12,825,467
Ohio River steel shipments[h]	73,250	67,875	96,400	1,169,321	1,305,870
Fabricated Products:					
Automobile production[i]	.....	346,886	399,638	4,616,857	5,016,565
Construction contracts[j]	$195,472‡	$209,452‡	$242,719‡	$2,675,296‡	$2,913,060‡
Steel barrels shipped[e]	.....	644,287	919,290	8,600,493	9,869,212
Steel furniture shipments[e]	.....	$2,125‡	$2,271‡	$19,246‡	$26,973‡
Steel boiler orders[e] (sq. ft.)	.....	546,615	654,159	11,511,557	9,923,457
Locomotives ordered[k]	9	77	46	533	368
Freight cars ordered[k]	25	3,287	10,881	68,341	52,788
Machine tool index[l]	118.4	142.7	200.3	201.7†	140.8†
Foundry equipment index[m]	76.8	111.2	190.9	219.3†	106.5†
Non-Ferrous Metals: (net tons)					
Lead shipments[n]	.....	34,020	45,718	513,361	575,933
Lead stocks[n]	.....	129,131	169,776	.....	.....
Zinc shipments[o]	24,931	29,545	51,227	561,969	570,111
Zinc stocks[o]	88,532	64,776	33,775	.....	.....
Tin deliveries[p] (gross tons)	5,550	5,020	7,615	74,005	83,665
Refined copper deliveries[q]	30,705	22,788*	86,791	819,007	865,893*
Refined copper stocks[q]	299,133	259,908	142,374	.....	.....
Exports: (gross tons)					
Total iron and steel[r]	.....	626,418	201,511	3,157,341	7,567,884
All rolled steel[r]	.....	259,113	110,139	1,167,244	2,597,083
Finished steel[r]	.....	191,442	103,495	1,040,815	2,125,157
Scrap[r]	.....	319,016	68,884	1,877,136	4,039,143
Imports: (gross tons)					
Total iron and steel[r]	.....	25,792	43,063	666,728	533,160
Pig iron[r]	.....	9,128	12,434	165,909	111,697
All rolled steel[r]	.....	14,475	24,409	270,594	284,571
British Production: (gross tons)					
Pig iron[s]	761,100	783,800	650,700	7,681,600	8,495,200
Steel Ingots[s]	1,081,400	1,103,800	998,900	11,699,000	12,964,000

†Three months' average. ‡000 omitted. *Revised.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] United States Engineer, Pittsburgh; [i] Preliminary figures from Automobile Manufacturers Association—Final figures from Bureau of the Census, U. S. and Canada; [j] F. W. Dodge Corp.—37 Eastern states; [k] *Railway Age;* [l] National Machine Tool Builders Association; [m] Foundry Equipment Manufacturers Association; [n] American Bureau of Metal Statistics; [o] American Zinc Institute, Inc.; [p] New York Commodity Exchange, Inc.; [q] Copper Institute; [r] Department of Commerce; [s] British Iron and Steel Federation.

Capital Goods Output for the Week Slightly Lower

THE IRON AGE Weekly Index of Capital Goods Activity

(1925-27 = 100)

	Week Ended Feb. 19	Week Ended Feb. 12	Comparable Week 1937	Comparable Week 1929
Steel ingot production	39.2	40.6	108.9	117.0
Automobile production	61.4	61.1	92.2	129.0
Construction contracts	74.5	74.0	76.6	132.7
Forest products carloadings	50.3	49.8	65.9	116.9
Production and shipments, Pittsburgh District	53.4	55.5*	107.9	116.3
Combined index	55.8	56.2*	90.3	122.4

* Revised.

THE firmer upward trend that has been noticeable over the past three weeks in THE IRON AGE seasonally adjusted index of capital goods activity was prevented from developing into a gain in the index's position in the week ended Feb. 19 by contra-seasonal movements in steel production and in the Pittsburgh series. The present position of the index is 55.8, down 0.4 points from the previous week. The steel ingot rate, unchanged for the past three weeks, showed a loss for the week of 1.4 points after adjustments to compensate for the rising seasonal trend had been made. A similar condition existed in the Pittsburgh series, where the physical volume of activity was only slightly smaller than the preceding week, but after adjustments for the normally rising trend had been made a loss of 2.1 points was indicated. These two declines were more than adequate to overcome the slight gains in the other three components of the index.

For the fourth consecutive week the construction series advanced and the current position of this component, 74.5, is 12.2 points above the first week of the present year. Another contract for improvement of public utility facilities was chiefly responsible in maintaining the upward trend of this component. This contract, let by the Northern States Power Co., amounted to $6,811,000. Another large contract reported during the week was for a private housing project at Springfield, Pa., involving an expenditure of $4,000,000. Automobile assemblies during the week totaled 59,100 units, a gain of 1290 over the previous week. In a comparable week a year ago assemblies were 88,740 units.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

. . . . THIS WEEK ON THE

. . . Auto sentiment greatly improved after steel prices are re-affirmed.

o o o

. . . Output continues seasonal climb, following gains in sales of new and used cars.

o o o

. . . Furtherance of Peace Board plan is advocated to settle feud between CIO and AFL.

o o o

. . . Union activities spurt at Ford, Chrysler and GM.

DETROIT, Feb. 21.—A better sentiment became apparent in the automobile industry in the latter half of the past week. The reaffirmation of prices on hot rolled steel contributed largely to this feeling.

A brigher outlook for steady automobile production, with increases as spring draws near, also established itself because sales for the last week were better than anticipated.

Steel Needs May Be Low

Consideration of the automobile industry's need for steel in the next few months does not arouse any great enthusiasm, however. Only March, April and May remain in the industry's best selling season. It seems unlikely that more than two and a half million cars of the 1938 models will be produced. Probably already built and in the hands of customers or factory representatives are a million and a half cars. So, for the industry as a whole, it can be said that it is probably past the half-way mark.

If the outlook for steel is predicated on full automobile production during the spring months, consideration still must be given to some sizable inventories that are on hand. For instance, Chrysler, it has been revealed, had steel on hand for approximately 60 days' normal production when it started the new year on Jan. 1. Hardly more than one-fourth of this has been used because the plants have been on a reduced schedule. Probably five to six weeks' requirements, at five days a week, are still on hand. Ford will not make another buy in quantity for 30 days. Oldsmobile, with its projections on car production cut more than half to 100,000 cars, says that it will need no more steel for this year's cars. In fact, parts have been already fabricated for nearly 90 per cent of its probable 1938 car sales. The Fisher unit which supplies Olds finds itself in the same fix with regard to steel needs. Packard, even though it has recently stepped up production, is not a likely buyer of steel for some time.

The foregoing is no contradiction of earlier statements that inventories were depleted, because by normal standards they most certainly are. The condition that exists hinges on the car sales and production figures. In comparison, something was learned last week about the size of inventory which one of the major automobile corporations had this time a year ago. This corporation and its divisions had on hand, according to its chief executive, 830,000 tons of steel and 950,000 tons of coal, bought, paid for, and in storage. So successful was this firm in anticipating price increases that not a pound of high-priced material (including non-ferrous) went into its 1937 production. Whether the investment of so much cash in advance paid for itself or not is a problem in arithmetic, but it is on the record that this company was one of the last to make any upward adjustment in its prices.

Output Makes Further Gain

Output registered a minor gain again last week, with the total rising from 57,810 to 59,100 cars and trucks in the United States and Canada, according to Ward's Automotive Reports. This compares with 88,740 units in the corresponding week last year. Output of the Ford V-8's was 18,500, Chevrolet 15,000, Plymouth 4500, all approximately the same as the week before. The Ford company's total production of 19,265 was a shade under the 20,760 of the previous week, while slight gains were registered by almost every other producer, with Studebaker and Packard standing out. Willys-Overland, calling its men back to work and getting under way again after a shutdown, contributed to the improved sentiment. Continued slight gains should be registered by the industry in forthcoming weeks.

Sales Are Increasing

An increase in retail deliveries by Dodge dealers week by week is reported, with the increases running more than 10 per cent in Dodge and Plymouth passenger cars and Dodge trucks, and as high as 18 per cent in commercial car units. A van DerZee, general sales manager of the Dodge division, asserts that reports from his dealers show used car stocks 9½ per cent lower than a year ago. The upward swing is so sharp and sudden that Mr. van DerZee says, "We are making plans based on the assumption that our business this year, during March, April and May, barring unpredictable difficulties, may show greater increases (relatively) than for each of these months in past years."

Continued improvement is reported by Buick in new and used car sales. Up to Feb. 10, 2860 units were delivered, compared with 2587 in the first 10 days of January. This is 1960 cars more than the total of 1791 delivered in the corresponding period last year, an increase of 59 per cent. At the same time Buick dealers throughout the country showed a reduction in used car stocks, with used car sales during the period totaling 8133 against 6053 in the first 10 days of January and 6986 in the corresponding period of February last year.

Spotting business activity as indicated in sales reports, the greatest gains in sales were registered in Eastern and Southern areas, with the Mid-

ASSEMBLY LINE . . . .

By W. F. SHERMAN
Detroit Editor

west and Pacific Northwest also showing an upturn.

Hudson dealers, with the aid of the new 112 model, boosted the sales figure for the second week in February 50 per cent above the corresponding week of January, before the new model was introduced to the public. With spring just around the corner, Packard has set up special assembly lines to turn out convertible types. Graham has announced that its production of the new Graham-Bradley tractor is being speeded up to meet spring demand that is already being felt. Interest in the new Ford tractor continues to increase, one unofficial report being that there are already thousands of inquiries from prospective customers. There are said to be 50,000 V-8 engines prepared for tractor installation and in storage awaiting the start of assemblies. National advertising probably will be launched within the next month, but meanwhile no complete information on the tractor design is available.

Hitting home with some good dollars-and-cents arguments, William J. Cameron, of the Ford Motor Co., a week ago told the story of mass production and costs, illustrating it with a simple object—the manufacture of the inner shell of a hub cap which now costs 12 and a fraction cents when made with modern machinery. He listed cost of dies, $13,328, automatic press, $30,770, and graphically compared machine production methods with pounding out this sheet metal part by hand. Cameron's talk, given over the radio on the Ford Sunday Evening Hour of Feb. 13, is being widely distributed by the Ford company. It is called "Machinery Creates Employment."

Toledo Plan Arouses Interest

That codes of ethics or manuals of policy to govern and clarify labor relations of large industries should be published and made available to all employees is the recommendation of Ralph Lind, who as first chairman of the Toledo Industrial Peace Board, had much to do with conciliation work in that city a few years ago. Lind, who is industrial relations counsel for a Chicago firm, proposed his plan recently before the American Management Association in Chicago.

A testimonial to the effectiveness of the Toledo Industrial Peace plan is seen in a resolution adopted by the Central Labor Union in Toledo, calling upon the President to put the same general plan into effect nationally in an effort to settle differences between the AFL and the CIO. It is proposed that the President invite John L. Lewis and William Green each to send a three-man committee to sit down with three citizens and two representatives of the Department of Labor. Otto W. Brach, delegate of the Molders Union, for many years a secretary of the Central Labor Union and one of the original members of the Toledo Industrial Peace Board, had suggested Dr. William M. Leiserson of the National Mediation Board; Father Francis Haas, member of the old Wagner Labor Board, and Edward F. McGrady, former Assistant Secretary of Labor and author of the Toledo Plan.

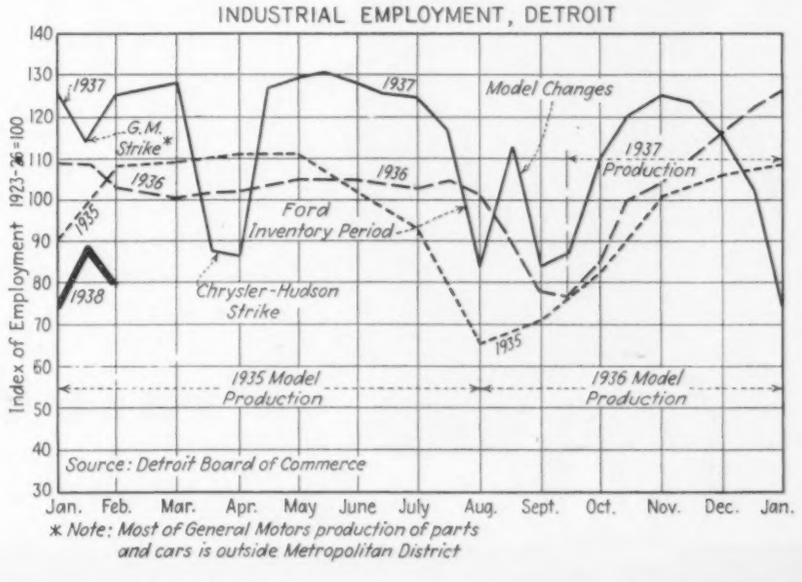
The board, which has done such outstanding work in the Toledo industrial area, has been functioning for the last two years as a municipal institution. It has just been upheld as a legal city activity in a formal opinion of the Attorney General of Ohio. The 18 citizen members of the Peace Board panel serve without compensation but the State Bureau of Inspection and Supervision of Public Offices had questioned the right to make expenditures of city funds for such activity. Incidentally, the appropriation for 1937 was $7,250, according to Edmund Ruffin, former newspaper man who is the board's director.

Toledo Employment Gaining

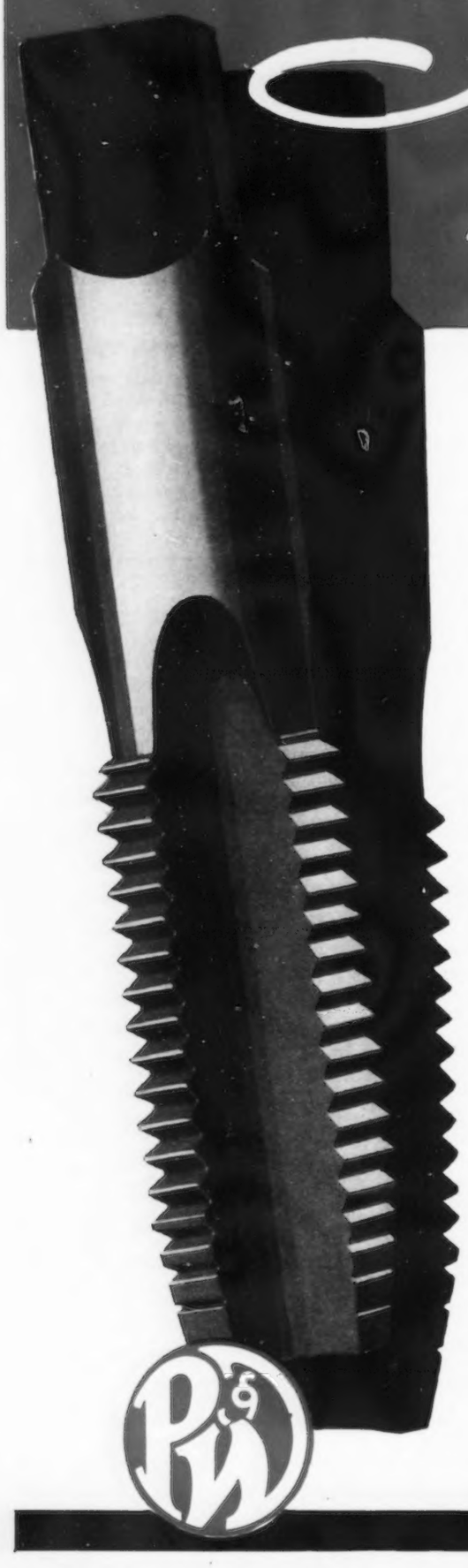
Production of automotive parts in the Toledo area has increased industrial employment since the first of February. Fifty-one plants reporting showed a gain of 134 men employed in the first week of February and another gain of 531 in the second week of the month. The return of Willys-Overland to production contributed largely to the second week's net gain.

Production of spark plugs by the Electric Auto-Lite Co. of Toledo is being increased considerably as a result of several factory contracts for use of the plugs as original equipment. In addition to Chrysler, DeSoto, Dodge and Plymouth, the company also will furnish the plugs for Nash-Lafayette and the American Bantam cars, which are now being produced at a rate of about 125 a week, with increases scheduled.

Early shipping activity on the Great Lakes is indicated, with the first movement of Lake Erie vessels already reported. Oil barges for Detroit will be



Speaking of TAPS



Here is a kind of Pratt & Whitney service you may not know about

You, as a manufacturer, must find it impossible to keep "up-to-the-minute" on all the new improvements that can better your product or lower your costs. It would take most of your working time just to read the mass of printed material on subjects that touch your business.

One such busy executive recently ordered a number of stock taps from us for a new job. Our representative, knowing the type of work to be done, asked the privilege of trying a P&W stock tap of slightly different design. The trial proved the new tap worked four times better, at no additional cost, and the order was changed accordingly.

This was no fault of the executive or anyone in his plant. Rather, it is to his credit that he took the advice of our representative, whose business is to know tap performance. Now he checks all his tapping work with us, and we see to it that he gets the most efficient, economical job possible.

It is a good habit to form—knowing and consulting our trained sales engineers. They never will waste your time needlessly, but they will give you the benefit of every new cost-cutting development. When you need taps—or any other small tools—call in the Pratt & Whitney man and get his advice.

Pratt & Whitney

DIVISION NILES-BEMENT-POND CO.

HARTFORD • • • CONNECTICUT

AUTOMOBILE race driving was abandoned by Walter Christie, once well known on the race tracks, but he has developed this tank for the British Government. It was paced at speeds as high as 53 miles an hour on rough ground by the Hudson Terraplane at the Westfield, N. J., airport. Mayor Curley of Boston and Government officials witnessed the test.

among the first ships across the Lakes. Coal movement to Detroit also will get under way shortly, barring extreme temperature drops.

General Motors Before NLRB

Hearing on a complaint against General Motors Corp. and the Delco-Remy Corp., a subsidiary at Anderson, Ind., will be started today before a National Labor Relations Board examiner. It is the first time the UAW has filed charges with NLRB naming any GM unit. Unfair labor practices and assistance to a company-dominated employees' association are alleged.

"The company union filed a petition with the NLRB for recognition as sole collective bargaining agent and we had to act in self-defense," a UAW spokesman declared.

Meanwhile the Independent Association of Chrysler Employees has made a demand upon Chrysler Corp. that it be recognized as bargaining agent for its members after the UAW contract expires March 31. The Dodge-Chrysler and Flint units of the UAW are waging heated election campaigns for local union officers and the union is paving the way for negotiations with Chrysler. However, no formal steps have been taken to negotiate a new contract with General Motors, where the present agreement will continue in force indefinitely.

UAW activity has taken on new vigor as a result of the first Ford organization meeting held last week in Dearborn. The crowd which attended exceeded expectations of the UAW officers and filled three auditoriums. Members filled the seats in a regular auditorium at the Fordson High School and in a gymnasium, then overflowed to the auditorium of another school. Because the loud speaker system was not functioning, speakers made three appearance, one in each hall. School officials estimated that approximately 4000 attended the meetings.

Business "Both Employer and Employee," Jeffers says

COOPERATION between management of industry and employees would help end the business recession, William M. Jeffers, president of the Union Pacific Railroad, recently told the Traffic and Transportation Association of Pittsburgh.

"Business is not exclusively the employer or the employee, it is both," Mr. Jeffers said. "And the best interests of both will be served when there is more sane thinking and direction in both groups."

OUT OUR WAY — BY J. R. WILLIAMS

AY NO SEE VY DEY CALL DEES FALLERS GOOD TIME BOYS! DEY HAFF DE HARD TAM TO GET HERE, A HARD TAM TO KIP WAKE ALL DAY, A HARD TAM TO KEEP FROM SPOIL DE SONDAY SUIT, A HARD TAM WIT NO BRAKFUS, NO LUNCH, A HARD TAM WIT DE--OH, AVERYTING HARD TAM!
WELL, THAT'S WHUT MAKES A GOOD TIME, IS A HARD TIME!
YOU SEE, IF WE GET THIS WORLD A UTOPIA, PEOPLE WILL BE HAVIN' SUCH GOOD TIMES THEY'LL BE LOOKIN' FER A BAD TIME TO FIND OUT WHUT A GOOD TIME IS.
COPR. 1938 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
THE STARTING WHISTLE
J.R.WILLIAMS 2-18

THIS WEEK IN WASHINGTON

. . . President's announcement favoring balanced level of prices is New Deal's program for promotion of business recovery.

o o o

. . . Frequent White House changes of front continue to be one of the most perplexing of problems in business planning.

o o o

. . . Business Advisory Council recommends to President several modifications in National Labor Relations Act.

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON.—President Roosevelt spent nearly an hour clarifying the Administration's price policy at a press conference on Friday, Feb. 18, during which he pledged his efforts toward "a balanced system of prices" to promote a "balanced expansion in production" and said the Government could attack the problem on many fronts and had already moved in that direction by passing the farm bill, authorizing a new housing program, and recommending expanded relief appropriations.

These factors will help in obtaining that balance of prices, the President said as he pointed to various price charts on exhibition for the benefit of newsmen. But there was no further clarification as to what the Administration's policy would be in regard to prices of products manufactured by what he described as "monopolistic" industries.

Asked what specifically the Government could do toward attaining a balanced price structure in the building material field after the President had referred to a chart showing price increases during the last 10 years on structural steel, cement and four other building material items, Mr. Roosevelt said that was a question covering industries more monopolistic in character and indicated he was not yet prepared to attack that phase of the problem.

The price trend of structural steel, as indicated by the chart prepared by Government economists, showed that the wholesale price declined from a 100 per cent base figure fixed for 1929 to a low of 78 per cent in early 1932 and rose to a present high point of 118 per cent. Cement, on the other hand, while dropping simultaneously with structural steel in the early part of 1932, increased to the 1929 level and maintained that level, increasing only slightly from 1933 to 1938.

Building Materials Above 1929 Level

The President called the figures significant because he said they indicated that prices on certain building materials are way above the 1929 level. Since the chart covered only building materials, it did not show the downward trend of prices on other steel products, an outstanding example being cold-rolled steel sheets. The price-chart display apparently was an effort to show the lack of flexibility in durable goods prices as compared with consumer goods. An accompanying exhibit referred to by the President indicated a sharp drop in wholesale prices of agricultural products since the spring of 1937.

While there was some speculation as to the effect of the price policy announcement, there was doubt expressed that it would be a considerable factor in any direction, at least for the time being. However, reaction on the stock market was adverse, stocks taking a tumble, but no particular significance was attached to Wall Street antics.

The price announcement was, in effect, the New Deal's 1938 program for business recovery. Since price maladjustments and speculative buying were cited as major causes of the present recession by the President and his economic and fiscal advisers, the Administration will seek a better balance of prices.

"Our program seeks a balanced system of prices such as will promote a balanced expansion in production," the President said, reading from a statement prepared by three Cabinet members and Chairman Eccles of the Federal Reserve Board. "Our goal is a constantly increasing national income through increasing production and employment. This is the way to increase the real income of consumers."

After completing the prepared statement, Mr. Roosevelt asked questions which he had prepared in anticipation of subsequent questioning and then proceeded to answer them. The catechism went something like this:

No Inflation Intended

Will inflation be a part of the program to restore balance in the price structure? The answer was no. Is further devaluation of the dollar anticipated? Again the answer was in the negative. Was the Treasury's gold "desterilization" of Feb. 14 a part of the plan to stimulate prices? Yes, Mr. Roosevelt said, that was one of the reasons.

Is the Administration's aim to re-

"A.W." *Rolled Steel* FLOOR PLATE

The Super-Diamond Pattern of "A.W." Rolled Steel Floor Plate, illustrated, gives a completely safe tread from any angle, under any condition. Serves pedestrian and vehicular traffic with equal efficiency.

Traffic aisle, stair tread, runway, catwalk—for every vulnerable floor area, for every safety requirement, "A. W." Engineers have developed exactly the right type and weight of "A. W." Rolled Steel Floor Plate. Slip-proof. Heat-proof. Crack-proof. Easy to clean and quick to drain. Low first cost. No maintenance cost..."A. W." Floor Plate can be cut to any shape and installed almost over-night without disturbing production. Booklet showing five patterns and giving complete engineering data sent on request.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNSYLVANIA::SINCE 1826:: DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Detroit, Los Angeles, Seattle, San Francisco, Houston, Buffalo, Pittsburgh, Cleveland, Chicago, Cincinnati, New Orleans, St. Paul, St. Louis, Montreal. PRODUCTS INCLUDE—"A. W." Rolled Steel Floor Plates : : "Swede" Pig Iron : : Billets—Blooms and Slabs : : Sheared Steel Plates : : Hot Rolled and Hot Rolled Annealed Sheets and Strip : : Steel Products also furnished in Copper and Alloy analyses.

store the 1926 level of prices? Yes and no, the President said. He went on to explain that a modifying factor to be taken into consideration was that the 1926 dollar represents the average of the dollar which was owed then but that since 1934 a great deal of money has been borrowed in terms of the 1934 dollar. Newsmen said they didn't understand exactly, but the President said that the modification goes downward, in response to further questioning.

He expressed the view that Administration moves in the field of housing and relief would tend to increase production, a factor which he said is needed badly.

Mr. Roosevelt by definite inference, if not directly, again went on record in opposition to further wage reductions. He said that had wages been increased in proportion to business improvement when industry was in a position to grant increases, instead of delaying them, industry would have had a longer period in which to make adjustment when production was curtailed, resulting in the maintenance of wage levels.

Are labor costs too high, the President asked. The real answer to that, he said, is that lower production costs should be found in increased volume rather than in reduced wages and cited figures showing an increase of 24 per cent in wages from 1932 to 1936. At the same time, he added, labor costs per unit of output were only 6 per cent higher. He attributed this partly to labor's productivity or efficiency increase but primarily to the fact that labor can be used more efficiently in mass production industries when they are operating at high output levels.

Despite a lack of wage increases during the past five months, Mr. Roosevelt continued, a shrinking volume of output forced up labor costs per unit of output as much as they had risen in the previous four years, or 6 per cent.

But while Mr. Roosevelt was pointing to the necessity of restoring a more balanced relationship between prices, speculation was aroused as to what part of the price maladjustment might have been caused by Government stimulants and other New Deal policies. It was recalled that structural steel, one of the building materials mentioned by the President, was vitally affected by PWA spending. Other prices conceivably could have been thrown out of the normal scheme of things by pump-priming activities of the Government but no mention was made of that possibility at the conference.

Relationship of Prices

The statement prepared by Government fiscal experts and cabinet members characterized as "an important factor" the behavior of prices as they affect full employment and high income levels. Careful attention, the statement said, must be given to the relations of prices as between various commodity groups; to the relations between price levels and debt burdens and costs and to the direction and rate of movement of the general price level.

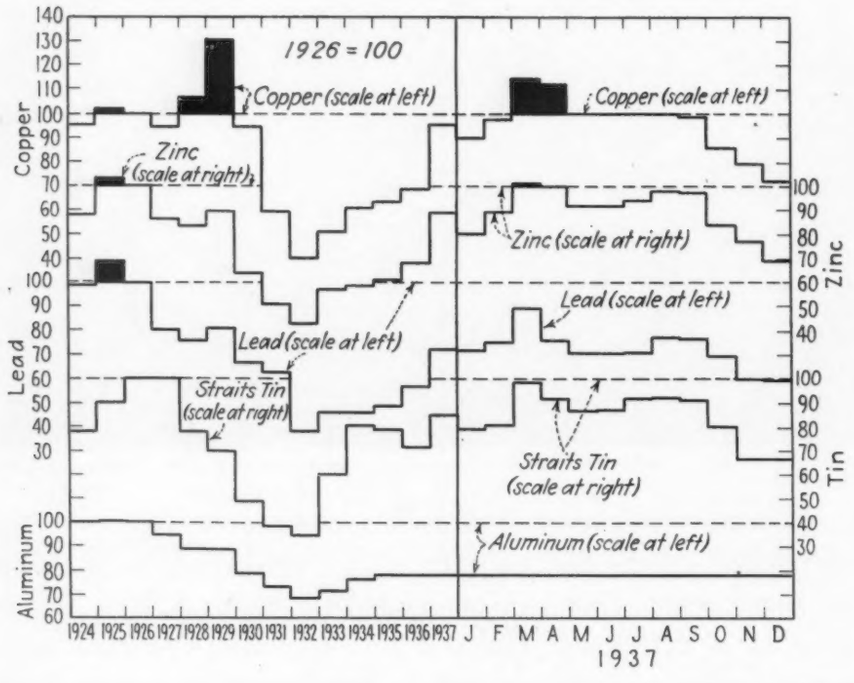
A year ago, the statement recalled, there was concern expressed over a too rapid rise in the prices of some commodities and that a speculative boom was in the offing as a result. Now, however, the general price level is headed downward, it added, expressing the opinion that "Government policy must be directed to reversing this deflationary trend."

"This does not mean that all prices should advance, nor that the rise should be rapid," the prepared statement said. "Prices of different groups of products must be brought into balanced relations to one another. Some prices and some costs are still too high to promote that balanced relationship between prices that is necessary for sustained recovery. Continued high prices of many of the commodities not subject to highly competitive market forces intensifies the downward pressure on all other prices. Thus industries that have maintained prices and curtailed output should seek the restoration of profit through increased rather than through restricted output.

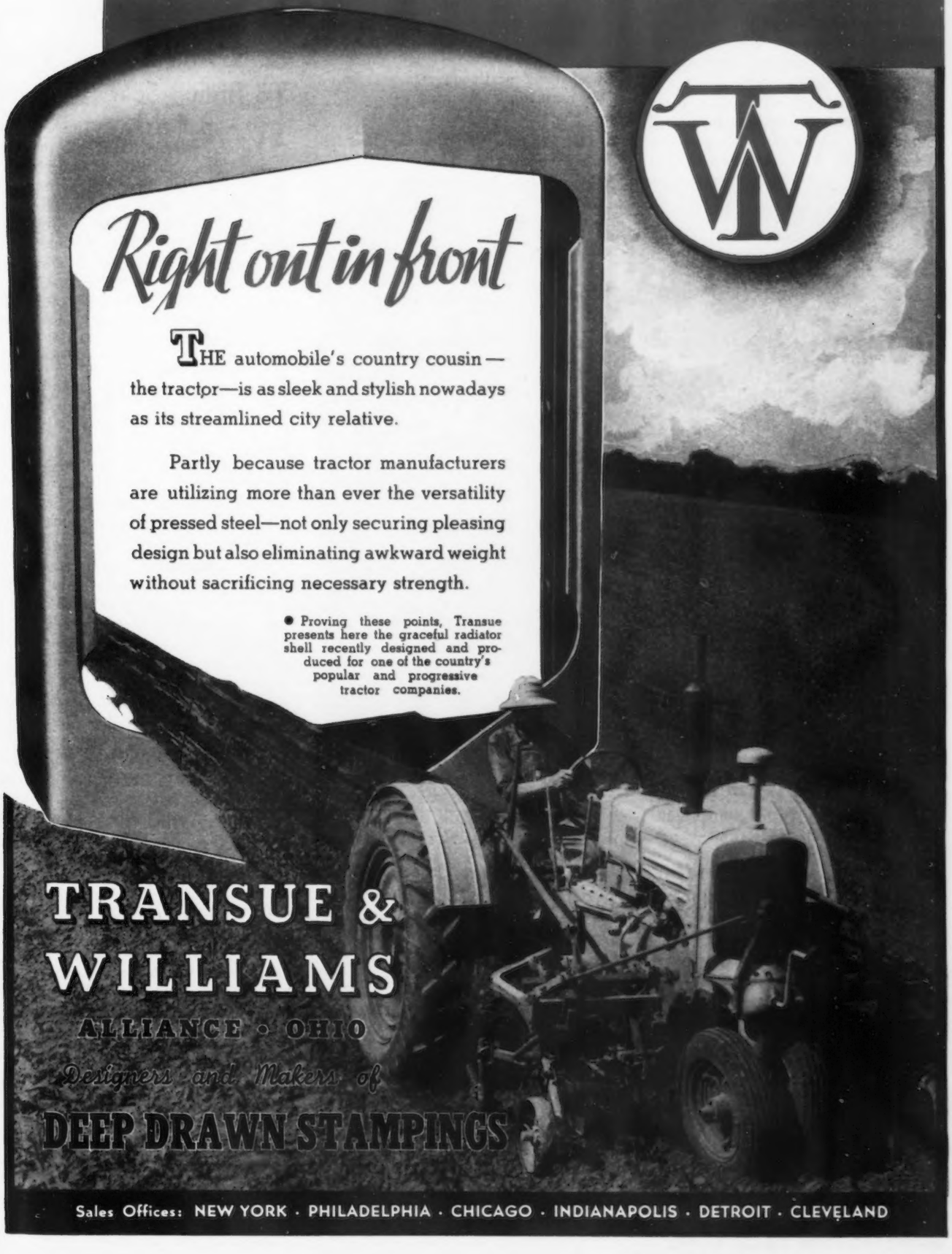
"The prices of some items are still at the highest levels reached in 1927; some are even higher than in 1929. When high prices sharply curtail sales there is real danger. This is shown by our recent experience in housing. A year ago there was a serious shortage. We had unused productive resources ample to overcome the shortage. Yet all the major elements in housing costs advanced so sharply by

Yearly Average Prices of Non-Ferrous Metals Still Below 1926 Level

WITH the exception of copper in 1928 and 1929, the average yearly prices of the major non-ferrous metals have been consistently below the 1926 level. In the spring months of 1937, copper and zinc quotations exceeded the 1926 price for a short time but the sharp decline at the end of the year brought the year's averages well below the 1926 base. The decline in tin prices in 1929 when other metals were rising is attributable to the many high-cost mining properties which were put into production in that year. The resulting increase in production was out of proportion to the increase in consumption and resulted in depressing the price level.


1926 = 100
Copper
Copper (scale at left)
Zinc (scale at right)
Lead
Lead (scale at left)
Straits Tin (scale at right)
Aluminum
Aluminum (scale at left)
Zinc
Tin
1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 J F M A M J J A S O N D
1937

TRANSUE STAMPINGS



Right out in front

THE automobile's country cousin—the tractor—is as sleek and stylish nowadays as its streamlined city relative.

Partly because tractor manufacturers are utilizing more than ever the versatility of pressed steel—not only securing pleasing design but also eliminating awkward weight without sacrificing necessary strength.

● Proving these points, Transue presents here the graceful radiator shell recently designed and produced for one of the country's popular and progressive tractor companies.

TRANSUE & WILLIAMS

ALLIANCE · OHIO

Designers and Makers of

DEEP DRAWN STAMPINGS

Sales Offices: NEW YORK · PHILADELPHIA · CHICAGO · INDIANAPOLIS · DETROIT · CLEVELAND

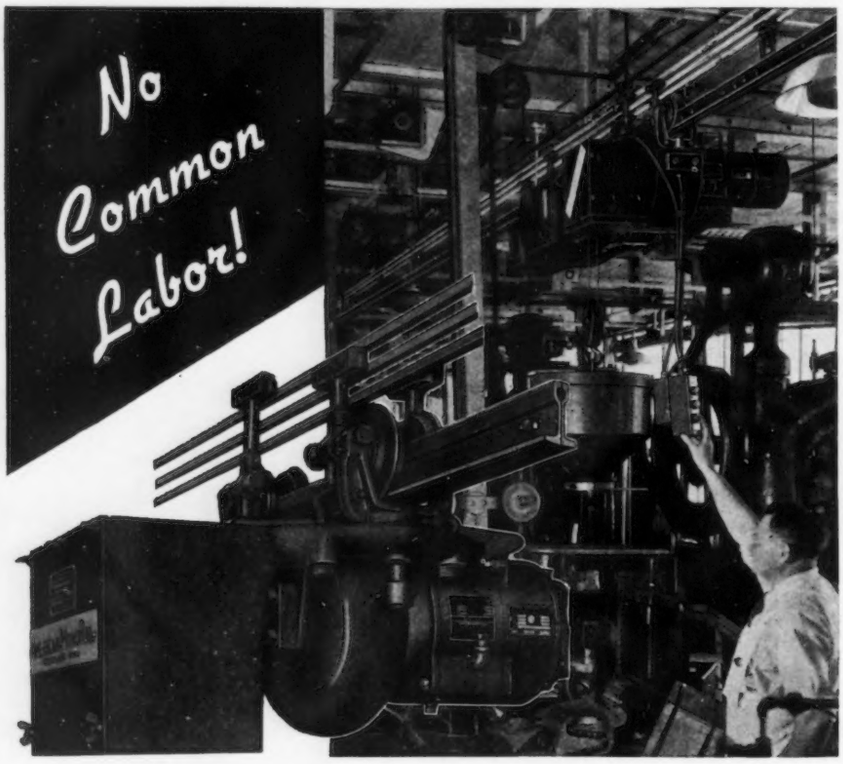
the spring of 1937 as to kill a promising expansion of activity in an industry whose restoration is vital to continued recovery."

Moderate Price Rise "Desirable"

The statement said a "moderate rise" in the general price level is desirable at the present time but warned that this rise should not extend to all prices. It added:

"The rise should take place in and must be mainly confined to classes of commodities whose prices are too low. These include most of those raw materials and finished products which are produced and sold under highly competitive conditions. Such rise must not be so sharp or continue so long as to lead to a repetition of the unhealthy speculative conditions of a year ago. That sharp rise in prices encouraged speculative inventory buying which, combined with the decline in housing construction, laid much of the ground for the present recession. We must do everything we can to prevent this from happening again."

The statement did not elaborate further, but merely pledged the Government's efforts toward a better balance of prices through industrial, agricultural housing and monetary programs. The effect of Government policies, such as taxation on prices, was not discussed.



. . . and no lost machine time. Slugs of semi-precious metal are delivered from a central control point by this automatic carrier. The skilled operator merely signals for metal and, when it arrives, unloads the carrier and returns it by push-button switch. Wise management gets full benefit from his skilled wage.

This is but one of the many systems designed by American MonoRail engineers for eliminating needless handling costs. Both manual and power operated carriers show labor saving returns.

A copy of 24 page book describing the MonoTractor drive is available. Write to the American Mono-Rail Co., 13103 Athens Avenue, Cleveland, Ohio.

U. S. Iron Exports To Britain Soar

WASHINGTON. — The Commerce Department's Bureau of Foreign and Domestic Commerce reported last week that pig iron exports to the United Kingdom increased from 30 tons in 1936 to 233,218 tons in 1937 valued at $6,114,000. Iron and steel scrap in 1937 more than doubled the amount exported in 1936, some 837,000 tons valued at $15,627,000 being shipped to the United Kingdom in the past year.

The department said that commodities classified as machinery and vehicles exported to the United Kingdom increased from $56,510,000 in 1936 to $72,745,000 in 1937. Contributing factors were gains of $7,500,000 in shipments of metal working machinery, exports of which were valued at over $19,000,000 in 1937, and substantial increases in other types of machinery.

The information was released, it was announced, in connection with the Administration's program of negotiating a reciprocal trade agreement with Great Britain.

Labor Board Certifies Three Craft Unions

WASHINGTON. — The NLRB has recognized three craft unions and one industrial union as exclusive bargaining groups for workers at the Allis-Chalmers Mfg. Co.'s plant at West Allis, Wis.

An election held by the board early in January gave three AFL affiliates bargaining rights for technical engineers and draftsmen; maintenance electricians; engineers, firemen and oilers. Election results also gave the UAWU bargaining jurisdiction for the balance of production workers.

The Labor Board also has certified the CIO's Amalgamated Association of Iron, Steel and Tin Workers as the bargaining representative for production workers at the Fedders Mfg. Co., Detroit, as a result of a NLRB election held on Jan. 28.

White House Changes of Front Continue to Perplex Business

WASHINGTON.—Frequent White House changes of front are so habitual that they have become the rule, rather than the exception. Therefore while the shifts may cause confusion and jitters, they no longer cause surprise. The truth is that the depression finally has the New Deal worried no end and it is anxiously switching from one policy to another in the ardent hope that it can check the downward business curve and start it upward, though so far it holds tenaciously to the principle of the undistributed dividend tax.

The Administration last year and up to recently was deflation-minded, despite huge spending and deficit financing that have raised the national debt to the imponderable aggregate of almost $38,000,000,000. Federal contributions of about $275,000,000 each month were withdrawn in 1937.

There is a difference of opinion on the subject but certainly it is generally accepted as a fact that the letup in this tremendous Government outpouring, on which millions had been nursed, was an important factor in bringing on the "recession." Lack of confidence may be marked down as the chief cause, but partial shutting off of the Federal treasury's spigot undoubtedly put a crimp in an artificial prosperity. Though it was living on borrowed money, which, soon or late, must be repaid in some way, by most painfully high taxes, and otherwise, there was created a purchasing power by these Federal funds, which, as a conscience opiate, have been freely distributed as political alms. Undeserving people have come to take as a matter of course—even demand as a right—Government largesse at the sacrifice of the deserving and impoverished whose instincts rebel against relief contributions but which necessity forced upon them.

Considering its constant dipping into taxpayers' pockets by way of the Federal treasury to make endless contributions of huge proportions to ingratiate itself with large voting groups, there is nothing strange about the domination of the New Deal with its peculiar legislative and administrative nostrums. They may be partially checked—though that is not an assured fact—by reason of a so-called greater independence in Congress. But they are far from being stalled. If there is any doubt on this point, attention is directed to the newly enacted farm act, so highly complicated that no human mind can comprehend it, and therefore impossible to administer, but dripping with limitless dollars, as political pap for a large agrarian section, which is brought under a system of bureaucratic vassalage. In this political coup, of course, a majority of the so-called independent Congress made up of the several partisan hues, also eager for dividends at the ballot box, did its doubtful part by voting for the 120-page "dreadful," seeing as the Administration sees, that a Congressional campaign is impending. Under the pious terms of "soil conservation" the act provides for controlled production—a policy of scarcity of human necessities—for which farmers are to be subsidized and the population forced

THIS WICK COULDN'T BURN
-without Tallow
To children, a lighted candle is only a flaming wick. They know nothing of the substance which makes the wick burn, nor do they care to learn. And coal consumers sometimes see only the flaming wick, failing to look beyond the companies from which they purchase fuel.
But alert buyers and engineers look behind the companies which sell coal to the iron and steel industries. They consider the SOURCE of supply. They know the best source of supply is one which backs its outlets with fuel engineering assistance. They know that reliable sources of supply help iron and steel industries use solid fuel in the MOST ECONOMICAL WAY.
Your dependable sources of supply are the 124 companies affiliated with Appalachian Coals, Inc. The ACI producing units operate in the eight high volatile districts of Kentucky, Tennessee, Virginia and West Virginia. ACI companies are equipped to furnish over 40 MILLION TONS of "all-purpose coals" annually, coals of exceptionally low sulphur content.
Write for your copy of "The ACI Family," a pocket size booklet listing ACI Agents, ACI Producers, seams, et cetera.
APPALACHIAN
STABILITY
KY
TENN
WVA
VA
ACI
QUALITY · SERVICE
COALS, INC.
Appalachian Coals, Inc.
TRANSPORTATION BUILDING · CINCINNATI, OHIO

to pay still higher prices for foodstuffs in the way of taxes.

The point has been reached where it is a question as to how much longer an apparently anesthetized country—or a large section of it—will close its eyes to these mounting sneak taxes, more or less skilfully hidden; to the alarming growth in the public debt and to regimentation of their business and personal affairs. Yet these "reforms" are being done under the cloak of "recovery." Dressed in suave phrase, they are pointed to as showing the way to the promised land of the more abundant life. The distribution of $500,000,000 plus X by the farm act for "soil conservation," an act which it is good to note was opposed by the powerful National Grange, was assured simultaneously with the House voting of still more relief funds, a "mere" $250,000,000 this time, which also have no strings attached as to their distribution.

They emphasized a shift toward inflation, despite Administration disclaimer of inflationary purposes. How much and how far is another uncertain quantity. This shift was made through the recent desterlization program. Under it the Treasury will refrain from sterilizing (burying) $400,000,000 of newly-acquired gold each year at the rate of $100,000,000 every three months. This means abandonment in part of the "sterlization" program which was adopted in December, 1936. When there were heavy gold importations which forced the Treasury to issue new currency the Administration maintained was a threat of dangerous credit inflation. The partial desterlization plan is meant to be a means of industrial pump-priming through expansion of the credit base. Many think the move will be ineffective, except that it may, contrary to the purpose intended, develop a fear of uncontrolled inflation. The desterlization itself, however, has been looked upon as having the possibility of good results if inactive gold can be turned to a means of credit assurance, really a "deflationary" effect. But the Administration talk about expanding credit hits a sour note, when it is remembered that the banks are bursting with idle money and interest rates are low.

The point gets back to the matter of confidence. Private capital is afraid and won't come out from the banks to earn money because of not only established Government policies which are harmful, such as its policy of "soaking" business by the surplus profits tax, but also of uncertainty as to forth coming policies. One day lower prices are urged. The next day higher prices are urged. One day a broad attack on "monopolies" is indicated. The next day a wide program of Government regimentation of business, implying price fixing and production control, is indicated by the super-monopoly—the Federal Government. The Washington merry-go-round won't stop long enough to let business recover from its dizziness.

It is submitted that it is constructive to suggest that an end be brought: To political play to special groups: to constant raids on the Federal treasury; and to whirligig policies.

Until that is done — probably a futile wish—business is not going to get a much needed breathing spell or confidence, the absence of which means the absence of recovery. Certain it is that, dramatized as they may be, the multiplicity and maze of White House "business" conferences will get exactly nowhere unless confidence is restored.

Super-Service Radial Drill Saves 50%
Schramm, Inc., of West Chester, Pennsylvania, report that this 5' arm, 15" diameter column SUPER SERVICE Radial Drill has increased production more than 50%.
Performing an important operation on Schramm Compressors . . . . .
SCHRAMM
Boring cylinders in the block of the Schramm "Utility" air compressor is one of the most important operations in the production of these nationally known, stationary compressor units. Accuracy and smooth cutting, of paramount importance in this phase of production—are achieved through the use of a Super Service Radial. Diameter of bore is 5¼" in the larger compressors, although smaller bores and a diversity of work are also handled on this machine.
Ability to perform precision boring operations successfully and economically is but another reason why progressive manufacturers rely on Super Service Radials.
THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI, OHIO, U. S. A.

Revision of Labor Relations Act Asked by Business Advisory Council

WASHINGTON. — Charles R. Hook, president of the American Rolling Mill Co., and John D. Biggers, president of Libbey-Owens-Ford Glass Co., called at the White House last week and submitted to the President on behalf of the Business Advisory Council a nine-point industrial relations program with recommendations that it be achieved through voluntary action and State and Federal legislation. Mr. Hook is also president of the National Association of Manufacturers.

Centering their proposals primarily around the Labor Relations Act, the advisory council recommended that the right of collective bargaining be exercised by both employer and employee "free from interference, restraint or coercion from any source"; that any favoritism shown by the board toward any particular labor group be abandoned; that corresponding responsibilities be imposed on both employees and employers; that Federal and State legislation be passed encouraging the settlement of labor disputes through agencies of arbitration; that fact-finding and judicial functions now exercised by the board be separated; that employer as well as employee be permitted to invoke the services of the NLRB in labor disputes; and that more specific definition of the rights and obligations of employees be made to eliminate discretionary definitions by the Board.

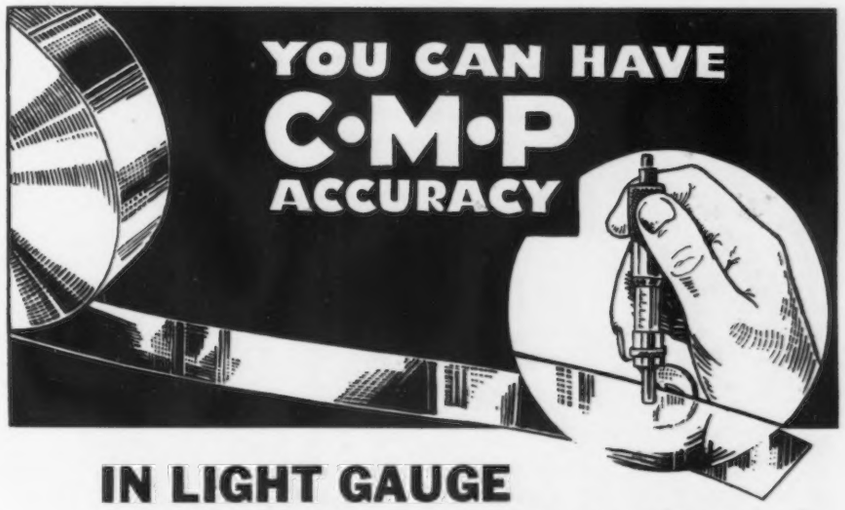
The council emissaries also asked for voluntary agreements and arbitration awards to be enforceable by law in an effort aimed at industrial peace. Banning of all controversial activities which interfere with public service or jeopardize the national defense likewise was urged.

NLRB Decision Favors AFL Machinist Union

WASHINGTON. — The AFL craft union principle scored another gain from the NLRB last week when the International Association of Machinists was certified as the exclusive collective bargaining representative for tool and die makers, tool grinders, and other skilled workers at the Waterbury Mfg. Co., Waterbury, Conn.

Although the AFL union constituted less than 200 of the plant's 1700 employees, the move was considered favorable to the craft union principle since the Waterbury Brass Workers Union, CIO affiliate, had vigorously protested to the Board against recognizing the AFL group.

The NLRB also has dismissed a CIO petition which sought an investigation of labor unions at the Richardson Co., Indianapolis, Ind., after the board had determined from an election that the CIO's United Automobile Workers union did not constitute a majority of the workers. The other union involved was an AFL affiliate. Neither group could claim a majority, the board found, and it dismissed the CIO complaint on those grounds.



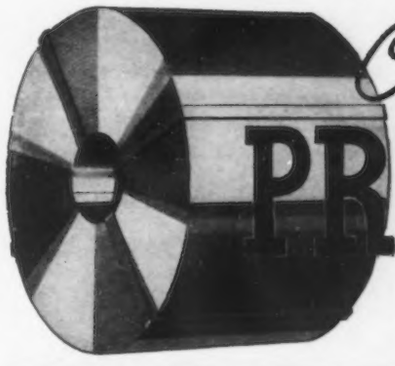
IN LIGHT GAUGE STAINLESS STRIP STEEL

Carbon grades of Cold Rolled Precision Strip Steel are widely known for their close limits of gauge accuracy over the complete width and length of the strip. They are more true to gauge than standard specifications and this feature is called "C.M.P. Accuracy."

Now, you can obtain stainless steel strip with C.M.P. Accuracy in any regular analysis and temper, in the largest coils you can handle and in gauges as light as .001".

C.M.P. Accuracy costs no more than standard tolerances but it gives you greater value. It assures more uniform production and more output per hundred pounds of metal. With stainless steels, these advantages are obviously of great importance.

The Cold Metal Process Co.
YOUNGSTOWN, OHIO



Cold Rolled
PRECISION
STRIP STEEL

Navy Finds It Leads In Ship Hull Welding

WASHINGTON.—The Navy has pioneered in the application of welding to ship's hulls and probably is well ahead of most other maritime nations, says a Navy Department report on the building of a battleship.

Referring to electric welding as an interesting problem of ship construction, the report said that during the past 10 years the Navy Department has applied its research activities to various difficult problems encountered in connection with welding, and has continued to use welding on a broad scale in all current construction. It said:

"The newness of the art of electric welding brought on many difficulties in connection with accuracy of work, dependability of workmanship, and complications due to shrinkage of the molten metal of the welds as they cooled. Most of these difficulties have been overcome or minimized, and the applications of welding have been reconsidered over and over again with the idea of utilizing this valuable method wherever it offers definite advantages over other methods, but not using it where there is evidence of misapplication or questionable advantage.

"Needless to say, electric welding will be used very extensively on the new battleships. The Navy Yards at New York and Philadelphia are, at the present time, making very careful studies and estimates in connection with this work, particularly with a view of improving the technique of welding so as to minimize difficulties, the training of welders in sufficient number to speed the work, and the procurement and more satisfactory installation of welding equipment of the most suitable type."

His might is multiplied . . . by modern Erie Steam and Board Drop hammers in hundreds of forge shops . . . modern forge shops whose products become vital parts in industrial machines, in motor cars, in thousands of products that today are Stronger . . . Safer . . . *Because of Forgings* . . . 35 years of constant improvement in hammer design and construction are yours when you buy Erie Hammers . . . 35 years of *Know How* . . . 35 years which help to make *Your Forgings* of finer quality and to reduce their unit cost . . . 500 forge shop men know that ERIE BUILDS DEPENDABLE HAMMERS.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U.S.A.

DETROIT 335 Curtis Bldg. | CHICAGO 549 Washington Blvd. | INDIANAPOLIS 335 Postal Station Bldg.
FRANCE Fenwick, S. A. | CANADA John Bertram & Sons Co. Ltd. | ENGLAND Burton, Griffiths & Co. Ltd.

Three Craft Unions to Bargain in One Plant

WASHINGTON.—The National Labor Relations Board has announced certification of three craft unions as collective bargaining representatives for employees of the National Sewing Machine Co., Belvidere, Ill. The International Molders' Union of North America was certified as exclusive representative of the company's molders, core makers, and foundry help. The Metal Polishers, Buffers, Platers and Helpers Union was certified as exclusive representative of the metal polishers, buffers, platers, and helpers. The International Association of Machinists was certified as exclusive representative of the production and maintenance employees except the above employees, and office, clerical, and supervisory employees.

The Board pointed out that there was no evidence to show that a plant unit, upon which the National Sewing Machine Company Employees' Council had tried to organize the workers, would function more effectively than the three units contended for by the craft organizations into which the employees' self-organization had propelled them, adding: "while we are not bound to regard as an appropriate unit for collective bargaining purposes such unit as any particular group of employees may choose, we are not prone to disregard such choice in the absence of convincing reason for so doing."

RFC May Lend Money to Railroads for Rehabilitation

WASHINGTON. — Coming immediately on the heels of his elaborate "balanced price" statement, the President's announcement through Chairman Jesse H. Jones of the Reconstruction Finance Corporation, that this agency was prepared to resume lending was interpreted as a further Administration effort to stimulate business.

The authorization for resumption of RFC loans was believed to be largely in response to the appeal of "little business" for expanded Government credit facilities, though it is questionable if such facilities as they relate to capital loans, as distinguished from working loans, will be available on a broad scale through the RFC, whose collateral requirements are held to be a difficult obstacle to overcome.

What Effect on the Railroads?

In the larger field there has been speculation as to what effect, if any, the extension of RFC loans may have on railroad demand for money to be used to purchase equipment and rehabilitate their plants. Actually such loans have never been restricted by the RFC. Therefore, it is not the belief that the plan of so-called "resumption" of loans will encourage railroad borrowing.

While the President's instructions of Oct. 18 to Mr. Jones restricting RFC lending activities were taken to mean no new loans would be made to railroads, it is recalled that both the President and Mr. Jones some six weeks ago said RFC would make any needed railroad loans. Since then but few of such loans have been asked and only two or three made.

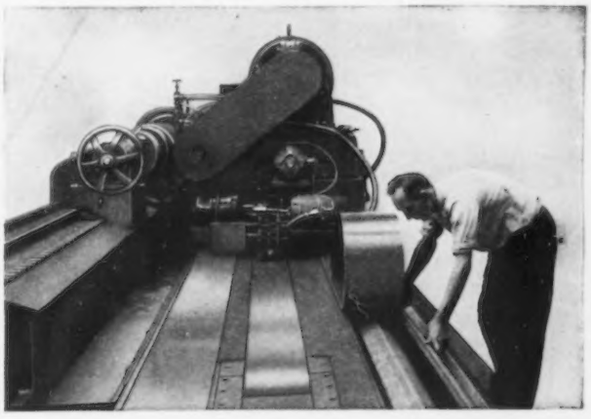
Generally railroads are in a position where maturity on obligations is at such distant dates that loans are not needed. In the face of declining traffic and the pending ICC decision in the 15 per cent case, railroads are holding back capital expenditures.

May Relax Collateral Requirements

As a means of encouraging railroad loans to be used to purchase requirements and stimulate employment, it has been reported that RFC would relax considerably on its collateral requirements. This report definitely lacks support so far as Mr. Jones is concerned. When he announced last Friday the policy of resuming loans, the RFC chairman reiterated his policy of demanding good security. He pointed out that while the RFC was prepared again to make industrial loans even if the banks were reluctant to do so, he would make every effort to "qualify" applicants for loans where there was security offered which "appeared reasonably to assure repayment." The law itself calls for such assurance.

The RFC head stated the corporation has available about $1,500,000,000, but added that he did not think there would be a "demand for any considerable part of it." Pressed as to what part might be asked for, Mr. Jones said he did not believe it would be more than $200,000,000. He expressed

(CONTINUED ON PAGE 76)



FARREL ROLL GRINDERS HAVE INVERTED "V" WAYS FOR LIFETIME ACCURACY

One of the important design features of the Farrel Roll Grinder which prevents wear and thus contributes to its high precision and high productive capacity is the inverted "V" type ways.

These ways are cast separate from the bed and made from a special alloy iron which is a cleaner, harder, closer-grained metal than can be obtained in ways which are cast as part of the bed. Carefully fitted and machined in place, they are an integral part of the bed.

Lubrication of the way surfaces is provided by an automatic flood system which serves the additional function of cleansing the ways of foreign matter which might settle on them. Double protection is afforded by the flexible metal guards which fit closely over the way channels to exclude dirt and grit.

Thus every precaution is taken to preserve the finished surfaces on which the carriage rides, the accuracy of which is essential to the most efficient functioning of a machine for fine precision grinding.

The inverted "V" ways of Farrel Roll Grinders show no distinguishable wear after years of operation. With the elimination of inaccuracies due to wear of the ways, the need for manipulating the machine by human skill in order to overcome the bad effects of wear has also been eliminated.

The low-cost, high-output, high-accuracy performance of Farrel Heavy Duty Roll Grinders is the result of a combination of design features which are fully described in Bulletin No. 111. A copy will be sent free on request.

FARREL

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

. . . NEWS OF THE WEEK . . .

Forums Planned On Surface Standards and Equipment Buying

A DEPARTURE from the usual form of technical society sessions will characterize the first annual membership convention of the American Society of Tool Engineers to be held coincident with the Machine and Tool Progress Exhibition, March 9 to 12, at Convention Hall, Detroit.

Technical sessions will be confined to evenings, with daytime free for inspecting exhibits and visiting plants. At each evening session, discussion will be confined to one major topic of live interest to production men.

At the Wednesday evening (March 9) session, the topic will be "Standards for Surface Quality," with the introductory paper presented by Dr. E. J. Abbott, president, Physicists Research Co. Following Dr. Abbott, Harry T. Woolson, executive engineer, Chrysler Corp., and past-president, Society of Automotive Engineers, will discuss the subject from the viewpoint of what such specifications mean to the engineer. R. V. Hutchinson, designing engineer, Olds Motor Works, and F. J. Malone, assistant to the president, Hercules Motors Corp., will discuss the subject from the production man's point of view.

Similarly, Thursday night, the topic "Selecting and Buying Equipment" will be introduced by Edwin Johnson, manager of costs studies, Packard Motor Car Co., and will be discussed from the shop angle by P. W. Brown, general superintendent, Wright Aeronautical Corp., from the purchasing viewpoint by Tom Higgins, purchasing agent, General Electric Co., while the supplier's side of the story will be tackled by A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney Co.

J. R. Weaver, director of equipment, Westinghouse Electric & Mfg. Co., will be chairman at both of these technical forums. Featured speaker at the society's annual dinner Friday night, at the Hotel Statler, will be Ralph Flanders, president, Jones & Lamson Machine Co.

Plant visits are being planned on regular schedules to Detroit's leading mass production plants, while arrangements have also been made for "open house" at and trips to a large number of machine, tool, and suppliers' plants in Detroit. Among mass production plants already scheduled are the following: Ford, Great Lakes Steel, Chrysler, Hudson, Burroughs Adding Machine, Cadillac, Champion Spark Plug, Thompson Products Corp., Timken Detroit Axle, Packard, and U. S. Rubber.

Toledo Industrial Peace Board Is Upheld As Legal

CLEVELAND.—The Toledo Industrial Peace Board, which has been functioning as a municipal institution for two years and settling industrial labor controversies, has been upheld as a legal city activity by Attorney General H. S. Duffy of Ohio, in answer to a challenge by State Bureau of Inspection officials.

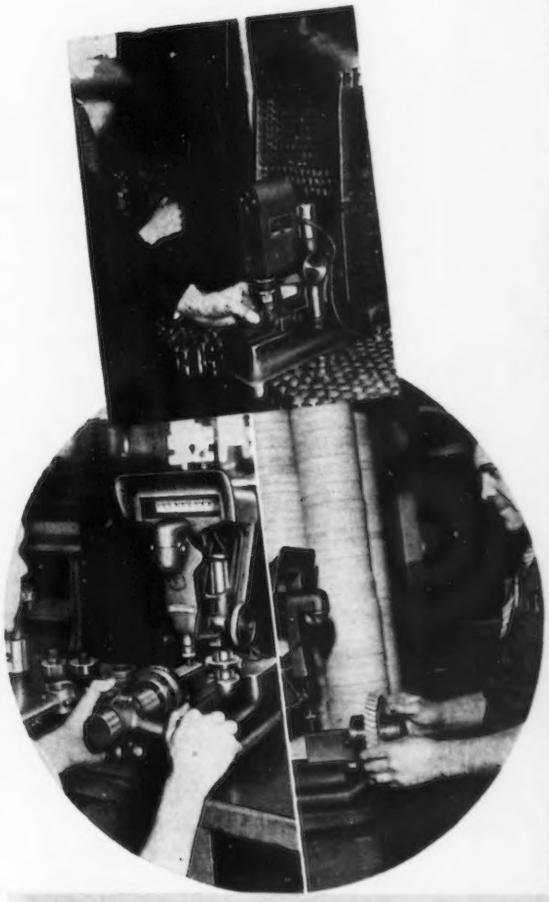
Pointing out that the board is acting in the interest of the public, Duffy said there were no barriers in the State or Federal constitutions which would prohibit Toledo from paying salaries and expenses of the board, which spent $5625 in 1936 and $6950 in 1937. The 18 citizen members of the board serve without compensation.

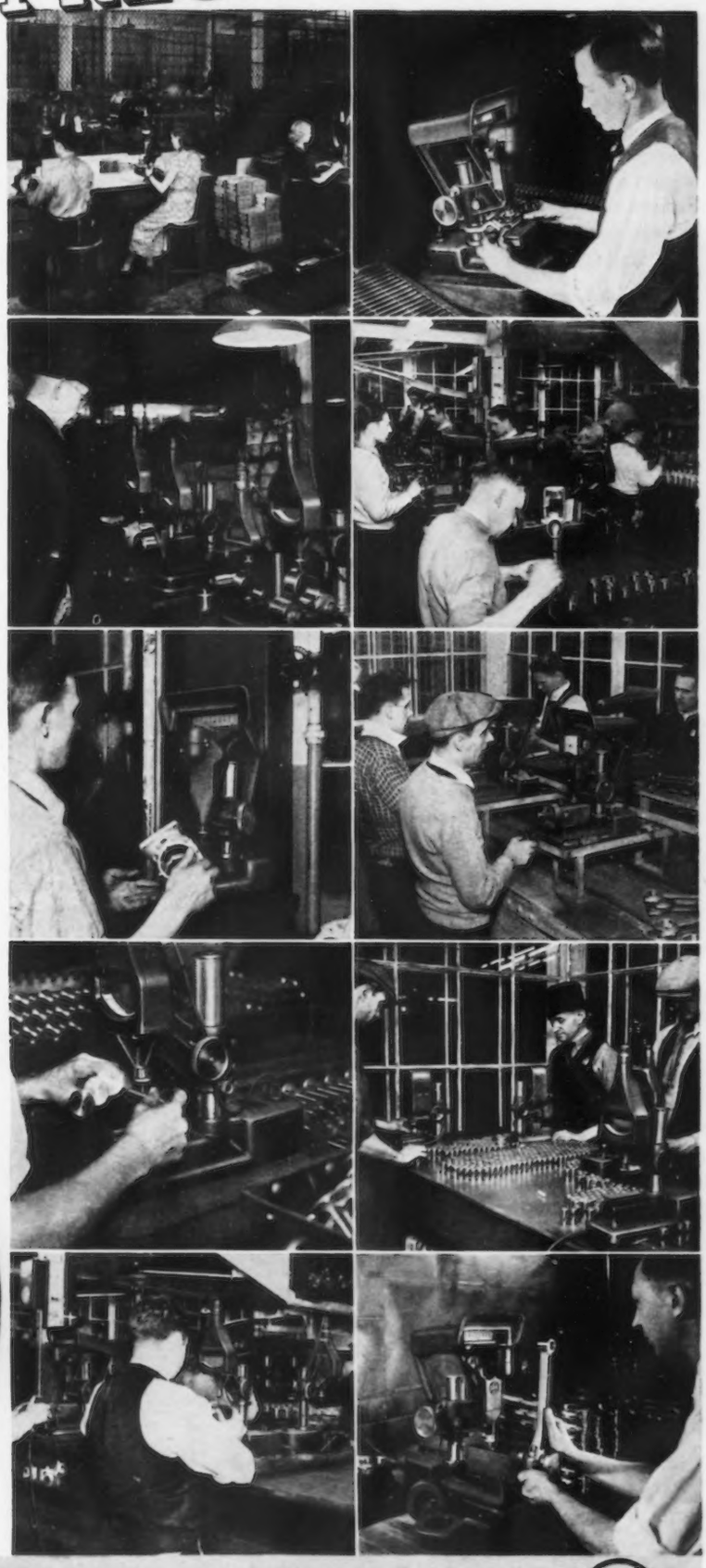
NEWS AND MARKET INDEX

Personals	77	New York Market	94
Obituary	83	Scrap Market and Prices	96-97
Steel Ingot Production	84	Finish Iron & Steel	98-99
Summary of the Week	85	Warehouse Steel Prices	100-101
Pittsburgh Market	86	Pig Iron & Raw Material Prices	102
Comparison of Prices	87	Non-ferrous Market	103
Chicago Market	89	Machine Tool Activity	104
Cleveland Market	91	Fabricated Steel	105
Philadelphia Market	93	Plant Expansion & Equipment	106

LOW COST PRECISION WITH SHEFFIELD VISUALS

The Sheffield Visual Gage, magnifications up to 10,000, is a positive acting gage that is deadly accurate and holds adjustment — measures outside diameters, inside diameters, taper and out-of-round — rapid set-up — instantaneous readings.





SHEFFIELD GAGE CORPORATION, DAYTON, OHIO, U.S.A.

Steel Institute Opposes Tariff Reductions on Steel for British

THE American Iron and Steel Institute urges that no tariff concessions be granted on iron and steel products under the proposed reciprocal trade agreement between the United States and the United Kingdom.

A brief, bearing the signature of W. S. Tower, executive secretary of the institute, filed Feb. 25 with the Committee for Reciprocity Information at Washington, cited arguments against concessions on iron and steel products, as follows:

1. There is no economic necessity or reason for imports of iron and steel products into the United States because of the ample productive capacity of the American iron and steel industry.

2. Because of high wage levels for American steel workers compared with those of foreign countries, any further tariff concessions would serve only to give foreign producers an added competitive advantage over domestic producers.

3. The argument is wholly misleading that because iron and steel imports are equal only to a small fraction of total domestic production, domestic producers are not affected by imports. While the sale of such imports may be confined largely to seaboard areas, the ultimate competitive effect may be widespread, for the reason that the seaboard distributers and users of such imports are in direct competition with inland distributers or users.

4. Any concession of rates for the United Kingdom would amount to a general tariff revision because the same concessions would apply as well to all other foreign countries with which commercial treaties of the United States provide for most-favored-nation treatment.

The brief compares earnings of wage earners in American steel mills with earnings of steel employees in foreign countries. It says in part:

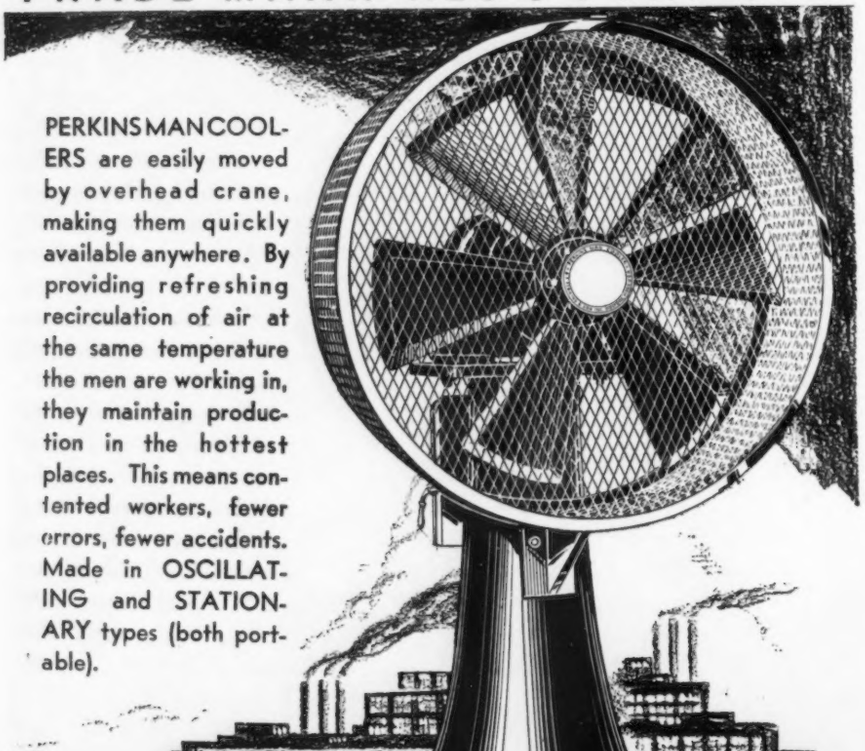
"The point which we wish to bring to your attention in this connection is that iron and steel producers in the United Kingdom and in other foreign countries already have a very substantial advantage in one of the chief items of cost as compared with producers in the United States, because of the much lower level of wages paid to labor in those countries.

"The average hourly earnings of American iron and steel workers in the year 1937 amounted to 82 c., which figure, according to our latest available information, is more than twice as much as the average hourly rate in the iron and steel industry of Great Britain, and nearly three times as much as the general foreign average. Any further tariff concessions on iron and steel products granted under the proposed agreement with the United Kingdom will, of course, serve only to give foreign producers an added advantage in competing with domestic producers in the markets of this country.

"It must also be emphasized that any such advantage will accrue not only to producers whose mills are located in the United Kingdom and in the British Colonial Empire, but also

ORIGINAL *and* ONLY MAN COOLER

TRADE MARK · REG · U · S · PAT · OFF ·



PERKINS MAN COOLERS are easily moved by overhead crane, making them quickly available anywhere. By providing refreshing recirculation of air at the same temperature the men are working in, they maintain production in the hottest places. This means contented workers, fewer errors, fewer accidents. Made in OSCILLATING and STATIONARY types (both portable).

B. F. PERKINS & SON, *Inc.*

Engineers and Manufacturers

HOLYOKE · MASSACHUSETTS

to producers in all other foreign countries with which commercial treaties of the United States provide for the most-favored-nation treatment."

The hourly earnings in various countries were stated as follows:

	Hourly Earnings	Year
United States	67.1c.	1936
United States	82.0	1937
Belgium	16.0	1936
France	37.0	1935
Great Britain	34.5	1935
Italy	21.0	1935
Japan	8.0	1936
Poland	22.5	1936
Sweden	29.0	1935

The following table showing the average number of man-hours required per gross ton of steel products made in representative steel plants in the United States, which such plants are operating at from 55 to 60 per cent of capacity, as determined by the Bureau of Labor Statistics, of the United States Department of Labor, was also presented:

	Number of Man-Hours Required
Average, all products	53.00
Billets and slabs	29.03
Structural shapes, in rolled form, not fabricated	33.91
Wire rods	35.60
Plates, sheared and universal	36.54
Concrete reinforcing bars	36.97
Standard rails, including fastenings	38.54
Bar steel (merchant steel bars, light shapes, etc.)	39.35
Hoops and bands	42.00
Wire, drawn	51.19
Sheets, all grades	58.19
Wire fencing	60.37
Wire nails	61.61
Pipe and tubing	62.72
Steel car wheels (rolled)	63.97
Railroad axles	64.07
Wire, flat, including steel in strips	67.00
Tin plate—terne plate	80.63

Santa Fe Adds 12 Streamlined Trains

CHICAGO.—Only two months after the Union Pacific-North Western announced their "City of San Francisco," the world's longest and most powerful diesel streamlined train, the Santa Fe Railroad brings out 12 new streamlined trains, giving that road a total of 13 such trains, seven of which are diesel-powered, and bringing the carrier's total of lightweight steel passenger cars to 151. Before summer the Santa Fe will have in operation what is said to be the greatest collection of railroad diesel-electric power ever assembled—a total of 30,900 hp., 23,400 in road service and 7500 in switching service.

Highlighting the Santa Fe program are three additional new transcontinental trains which will keep up the pace of 39¾ hr. maintained between Chicago and Los Angeles by the Super Chief; two new stainless steel streamliners for fast daylight runs between Chicago and Kansas City, and a new lightweight train between Los Angeles and San Diego. All of these trains will be operated by diesel-electric locomotives built by the Electro-Motive Corp., La Grange, Ill.

Detroit Warehouse Prices On Galvanized Sheets

DETROIT.—A special differential in the warehouse price on quantities of galvanized sheets (No. 24) has been put into effect in Detroit. The change affects Detroit only. On quantities of 1500 to 3749 lb., the net is the base price of 5.40c. less 25c. per 100 lb.; 3750 to 7499 lb., base price less 40c. per 100 lb.; 7500 lb. and over base price less 60c. per 100 lb.

REGARDLESS OF YOUR DOOR REQUIREMENTS THERE IS A KINNEAR DOOR TO FILL THE NEED

EFFICIENTLY!

Kinnear Rolling Doors open upward easily the year around. Out of the way! Convenient as a window shade! They permit space once used for "door storage" to be utilized . . . and today's efficient planning demands that every foot count. Furthermore complete designing cooperation, is assured when you specify . . .

KINNEAR ROLLING DOORS

Electric control! Another way for an even greater saving in time and labor. The Kinnear Power Operator makes it possible to open and close doors by merely touching a button, which may be located at any number of convenient points. It is a completely reliable and foolproof unit that can be easily attached to old or new Kinnear Doors, so that they can be operated quickly and easily, without wasting any time, steps or effort.

Kinnear RoL-TOP Doors, made of wood or steel, combine the space saving features of Kinnear Steel Rolling Doors and the added advantage of light and vision. Like all Kinnear Doors they are custom made to the individual opening . . . are accurately counterbalanced by torsion springs . . . are made for motor or manual operation and can be economically installed in old or new buildings. Write for details of Kinnear's complete line.

Offices and Agents in Principal Cities

The KINNEAR Mfg. Co.

1760-80 Fields Ave., Columbus, Ohio

Western Welding Gathering To Include 5 Technical Sessions

MORE than 18 papers will be presented at the five technical sessions of the Western Regional Conference of the American Welding Society to be held at Los Angeles, March 21-25, in conjunction with the American Society for Metals and the Western Metals Congress.

Two luncheon meetings have also been planned. At the first, on March 21, speakers will include P. G. Lang, Jr., engineer of bridges, Baltimore & Ohio Railroad, and president of the American Welding Society, and E. F. Scattergood, general manager, Los Angeles Bureau of Power and Light and chairman of the conference. Speakers at the second luncheon meeting, March 23, will include Warner S. Hays, managing director, American Welding Society. A dinner dance has been arranged for the evening of March 24.

Mornings will be devoted to technical sessions and afternoons will be left open, for the most part, for visiting the Western Metals Exposition, to be held at the Pan Pacific Auditorium.

The technical program is as follows:

MARCH 21

Symposium on Welded Oil Well Casing Strings: Weldability and Properties of Materials for Casing Strings, by Isaac Harter, Babcock & Wilcox Co.

Field Practice in Welding Casing Strings, by Howard Newby, superintendent, American Pipe & Steel Corp.

Physical and Economical Advantages of Welded Casing Strings, by a representative of the Shell Oil Co.

MARCH 22

Design and Fabrication of High Temperature and High Pressure Piping, by F. C. Fantz, Midwest Piping & Supply Co.

Reconditioning Existing Pressure Vessels to Meet Present-Day Safety Standards, by K. V. King, Standard Oil Co. of California.

Stainless Alloy Welded Plate and Castings Combined in Corrosion Resisting Pressure Equipment, by Richard Jameson, Electric Steel Foundry Co., Portland Ore.

Welded Plate Construction for Machinery Bases and Substructures, by Richard Young, Bethlehem Steel Co.

MARCH 23

Symposium on Large Welded Pipe for Water & Power Transmission: Design of Large Welded Pipe, Laterals and Supporting Structures, by Dr. W. F. Durand, Stanford University.

Shop Fabrication and Spinning of Protective Coating, by L. M. Muffler, Consolidated Steel Corp.

Field Erection and Inspection, by a representative of the Southern California Metropolitan Water District.

MARCH 24

Design of Welded Connections in Building Construction, by Paul Jeffers, consulting structural engineer.

Resistance Welding Processes and Their Application, by Stanley Levyne, Acme Electric Welder Co.

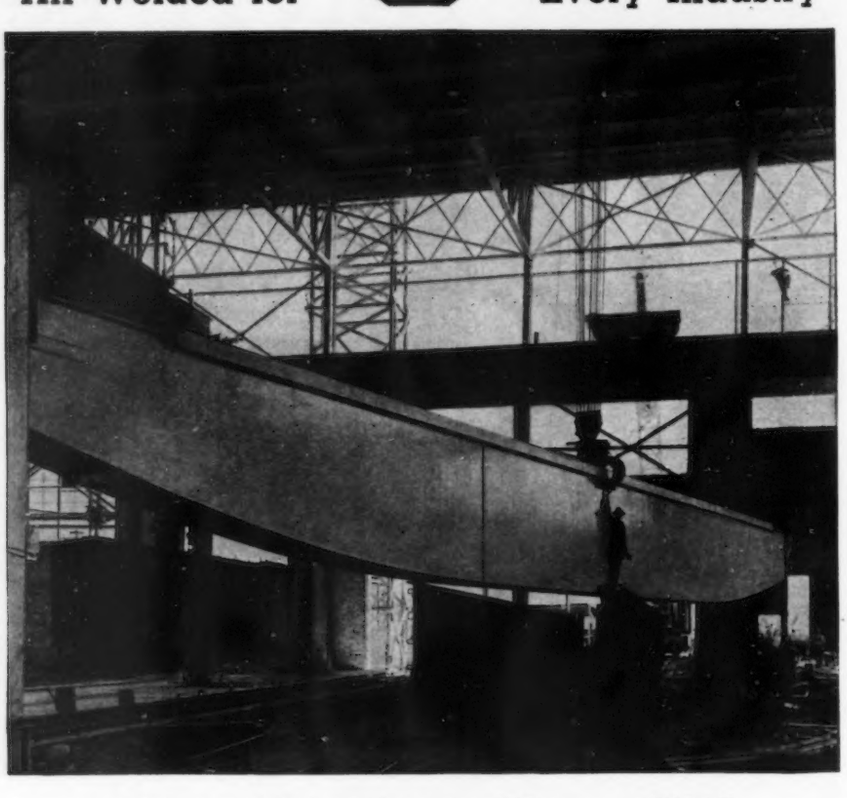
Problems in Welding Light Gage Materials, by a representative of the Linde Air Products Co.

MARCH 25

Application and Proper Use of Hard Facing Materials, by Don Llewellyn, Air Reduction Sales Co.

CLEVELAND CRANES

All Welded for Every Industry



• One welded girder of a 200 ton—100' 0" span, all welded Cleveland Crane being lifted into place.

ALSO BUILDERS OF

CLEVELAND TRAMRAIL

THE CLEVELAND CRANE & ENGINEERING CO

1115 Depot St.

WICKLIFFE, OHIO

NEW YORK • DETROIT PITTSBURGH • CHICAGO

MATERIALS HANDLING EQUIPMENT

Welding Cast Irons, by Prof. Gilbert S. Schaller, University of Washington.

Characteristics of Slags, their Application to Electrode Composition and Effect on Welding, by Dr. Welton J. Crook, Stanford University.

Helping the Small Job Shop Welder, by J. C. Gowing, J. C. Gowing Co.

Inspection of Welds and the Supervision of Welding Operators, by Russell Graves, Union Oil Co. of California.

Department of Labor Releases a New Display

SEVEN current important problems relating to labor and industry are portrayed in an interesting group of new displays which have been prepared by the United States Department of Labor.

Seven poster boards, each 4 x 8 ft., have been allocated to these displays, each of the boards taking up a different subject. They concern:

1. "Employment and Industrial Output." This covers two sides of one poster board, and portrays figures representing seven industries and "all manufacturing." It gives the production, employment and weekly payroll figures in each of the industries for the years 1929, 1932, 1935 and 1936 with a view to showing the trends throughout that period. The data were supplied by the Bureau of Labor Statistics.

2. "Women in Industry." This depicts some of the problems in this field, using charts, illustrations, maps, and timely texts dealing with the history of women in textile mills, the proportion of men and women employed in industry, and the salary rates paid women in the various occupations and types of offices. This display also covers both sides of the poster board and the information was furnished by the Women's Bureau.

3. "Minimum Standards for Employment of Women." This outlines a program toward which this campaign is directed, and includes maps showing what the states are doing in an effort to meet these standards. The display covers one side of a poster board and the information was furnished by the Women's Bureau.

4. "Occupational Diseases." Covering only one side of the poster board, this seeks to enlighten the workers, the employers and the public upon this subject by a text concerning the three-fold industrial health program, an illustration depicting proper safety devices and adequate washroom facilities, and maps showing what the states are doing in compensation for silicosis and occupational diseases generally.

5. "Industrial Injuries." An attempt is made here to show that industrial injuries can and must be prevented. Charts, maps and graphs indicating where the increases and decreases have occurred are presented in an interesting manner. This covers both sides of a poster board.

6. "Workmen's Compensation." This is another display to which one side of a poster board is given, and it seeks to portray, by a grouping of maps and charts, the work which the various States are doing in this field and what is contained in the laws of each State on the various phases of the problem. The Division of Labor Standards furnished the data for this exhibit as well as the data for the two preceding displays.

7. "Age Discrimination." Graphs, charts, and illustrations are portrayed in this display emphasizing pertinent facts in connection with age discrimination against the older worker in industry. The Division of Labor Standards will conduct a study of this problem in the near future.

All or any one of these displays may be borrowed for use at conventions and conferences by addressing the United States Department of Labor, Washington. The only cost to the user will be the minimum charge for shipment.

1938 TOOLS

1938 MACHINE

EXHIBITION

The latest in tools, processes, methods, equipment, and machines will be presented to industry in connection with the first annual membership convention of the American Society of Tool Engineers. Technical sessions will cover a wide variety of up-to-the-minute topics of vital interest to production men. Visits of inspection to all leading plants. Show and technical sessions open to non-members interested in industrial production.

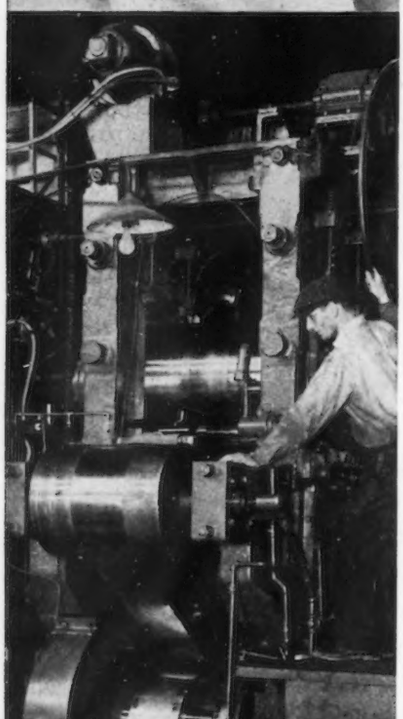
Make your reservations now

BALTIMORE: J. H. Chandler, c/o Glenn L. Martin Co.
BRIDGEPORT: C. A. Dundore, 1178 Wells Place, Stratford
BUFFALO: Ben Buerk, 315 Grote St.
CHICAGO: Willard T. Wilson, 1026 S. Homan Ave.
CLEVELAND: C. V. Briner, 1433 E. 12th St.
DETROIT: Floyd W. Eaton, Burroughs Adding Machine Co.
HARTFORD: Frederic L. Woodcock, 56 Imlay St.
MILWAUKEE: Julius A. Riedl, 3965 N. 15th St.
NEW YORK: Ben C. Brosheer, c/o American Machinist
PHILADELPHIA: C. O. Hersam, Industrial Cons. Eng'g. Co.
PITTSBURGH: D. L. Shelly, Westinghouse Air Brake Co.
RACINE: Henry Springhorn, 1615 St. Clair St.
ROCHESTER: J. S. Bartek, Consolidated Mach. Tool Corp.
ROCKFORD: H. O. Olson, 1610 Seventh Ave.
TOLEDO: Lorence E. Rennell, 206 Crawford Ave.
TWIN CITIES: G. Wilden, 1408 Park Ave., Minneapolis

EXHIBITORS: Space still available. Allocations in order of receipt. For full details write or wire A.S.T.E., 5928 Second Blvd., Detroit.

Stainless Steel Strip Specialists

Open Hearth Chromium-Nickel and Straight-Chromium Steels



Barium STAINLESS STEEL CORP.
CANTON, OHIO.

RFC May Lend Money to Railroads

(CONTINUED FROM PAGE 69)

preference for bank origination and participation with the RFC in loans to both big and small business and appealed to them to this end.

Easier RFC Requirements

"Ordinarily," he said in a statement, "we would prefer that the lending bank retain a 50 per cent interest in the loan, but if necessary we will consider a greater participation depending upon the circumstances surrounding the particular loan.

Asked about complaints of some small business men regarding RFC collateral requirements, Mr. Jones said there was a "possibility" that the RFC might "modify" its views on this matter but insisted that the question is one to be handled when actual applications are made.

Questioned as to whether the RFC was considering modification of collateral requirements for railroad loans, Mr. Jones was unwilling to make a definite statement. He said that "was a river which would be crossed when the RFC came to it." It is nevertheless the opinion here that the RFC chairman remains unwilling for easing of such requirements.

Prefer Railroad Reorganization

Such authorities as Commissioner Mahaffie and Senator Wheeler, chairman of the Interstate Commerce Committee, favor permitting railroads on the verge of bankruptcy, when unable to fully secure loans with sound collateral, to go through the wringer. It is their opinion that they should go into the hands of receivers and be reorganized soundly by reducing fixed charges.

It is, of course, necessary for a railroad to get ICC approval before the RFC can make a loan. In this connection Mr. Jones pointed out that, in instances where the ICC in approving a loan did not express a view regarding the necessity of a carrier to reorganize, the RFC can exercise its own judgment in determining whether a loan should be made.

Regarding the pending 15 per cent rate advance case, Mr. Jones has said that if the railroads do not obtain additional revenue by April they will be "out of the window." He said at that time that he saw no possibility of Government ownership in the near future. He asserted that he would favor consolidation of the railroads but added that he did not know what kind of legislation would be needed.

Discount Eligibility Of Machinery Paper Depends On Purchase

WASHINGTON. — No definite answer can be given in advance as to whether a note given for the purchase of machinery by a manufacturing concern is eligible for discount, the law department of the Federal Reserve Board said in finding eligibility depends on whether the purchase of machinery constitutes a permanent or fixed investment or is for any other fixed capital purpose. If a permanent investment, the note is not eligible for discount. If not a permanent investment, notes for the machinery are eligible for discount.

"Generally speaking," it was held, "the purchase of machinery by a manufacturing concern, which is expected to last over a period of a number of years or indefinitely, would seem to constitute a permanent or fixed investment and, accordingly, a note given for this purpose would not be eligible for discount. However, there may be machinery of certain types which wears out rapidly and must be replaced within a comparatively short time, and the purchase of such machinery might be regarded as an eligible purpose."

The Board stated the question is one which appears to depend upon the type of machinery in question as well as the other facts and circumstances of the particular case and upon which no definite answer can be given in advance.

Navy Asks New Bids On Ferromanganese

WASHINGTON.—Having cancelled previous bids for both manganese ore and ferromanganese, the Navy Department has issued a new schedule asking for 3000 to 14,000 tons of ferromanganese only. The bids are to be opened March 18. The schedule provides for tenders on either 78-80 per cent or 78-92 per cent ferromanganese. Bids are asked for either on the basis of delivery at the Philadelphia Navy Yard or f.o.b. cars or on wharf at or near the contractor's works.

..PERSONALS..

F. L. EBERHARDT, president and general manager of Gould & Eberhardt, Irvington, N. J., will sail for Europe on Feb. 26 to visit the Leipzig Fair in Germany. He will be accompanied by W. F. ZIMMERMAN, chief engineer and works manager of

F. L. EBERHARDT

the company. Mr. Eberhardt, who has been connected with the company for the past 57 years, will celebrate his 70th birthday on Feb. 27. He has always taken an active interest in the machine tool industry and was president of the National Machine Tool Builders' Association from 1907 to 1909.

❖ ❖ ❖

T. W. HAGER has been appointed vice-president of Peter A. Frasse & Co., Inc., New York, and will act as assistant to LESTER BRION, president. A. B. MEAD, formerly vice-president and manager of the Philadelphia office, has transferred his activities to New York, and will assume the duties of vice-president and manager of New York sales, with V. HANSEL as assistant manager in this district. J. W. PATRICK, JR., of the Philadelphia sales force, has been placed in charge in that city, and H. R. ROBSON has been made assistant manager of the Philadelphia office.

❖ ❖ ❖

H. A. HARVEY, heretofore assistant to the vice-president of the USL Battery Corp., Niagara Falls, N. Y., has been appointed vice-president, suc-

WAY BACK IN 1854

When Commodore Matthew Perry was opening the ports of Japan, this Company was pioneering in the Bolt and Nut Industry.

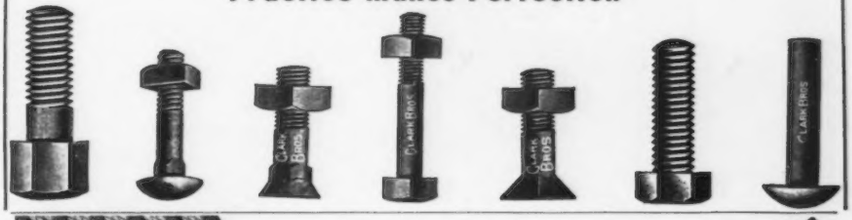
We can supply you with anything—standard or special—in the form of a Bolt, Nut or Screw.

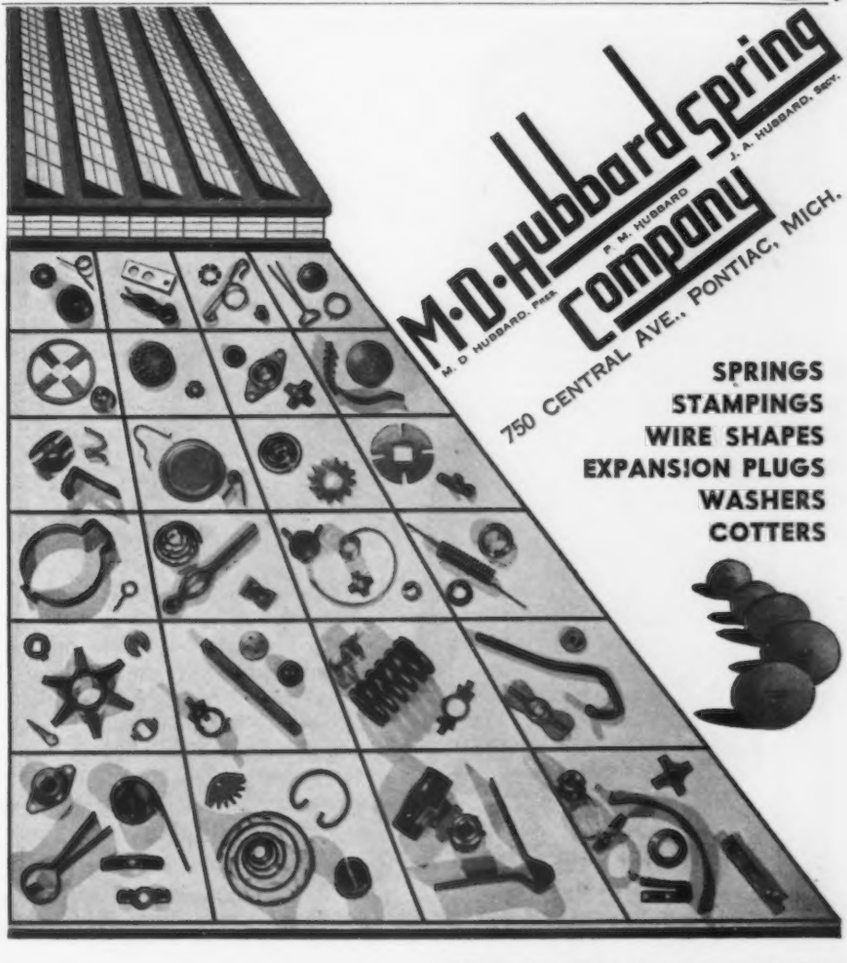
Give this dependable source of supply an opportunity of quoting.

CLARK BROS BOLT CO.

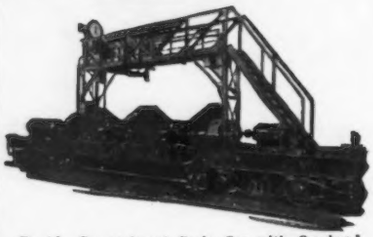
Milldale, Conn.

Practice makes Perfection

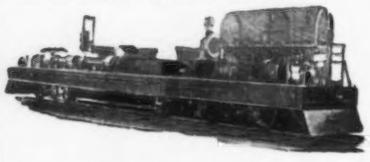




ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.



20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas-Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.

Engineers - Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

ceeding R. T. PIERSON, who has resigned. Mr. Harvey has been long associated with the company, having joined the organization in 1912.

❖ ❖ ❖

FLOYD W. EATON, supervisor of apprentices, Burroughs Adding Machine Co., was elected chairman Detroit chapter, American Society of Tool Engineers, for the coming year, at the chapter's February meeting. Named as vice-chairman was CHARLES W. THIEDE, chief tool engineer, Chrysler Corp. RALPH M. SMITH, process engineer, Detroit Gear & Machine Co., was elected secretary and GEORGE W. DEMAREST, in charge of plant layout and process at Packard Motor Car Co., was named treasurer.

❖ ❖ ❖

GLENN H. REARICK, previously identified with the Babcock & Wilcox Tube Co., Beaver Falls, Pa., as superintendent of the cold draw and specialty departments, has become associated with the Standard Tube Co., Detroit, as assistant general superintendent.

❖ ❖ ❖

G. SINDING-LARSEN, since 1924 identified with the engineering department of the Pittsburgh Piping & Equipment Co., Pittsburgh, has been made chief engineer. He has been engaged on research and development of creased bends and corrugated pipe and their application to steam lines and central station design. Mr. Sinding-Larsen came to this country in 1921 from Norway, where he was graduated from the Technical College of Oslo and where he received his early practical training.

❖ ❖ ❖

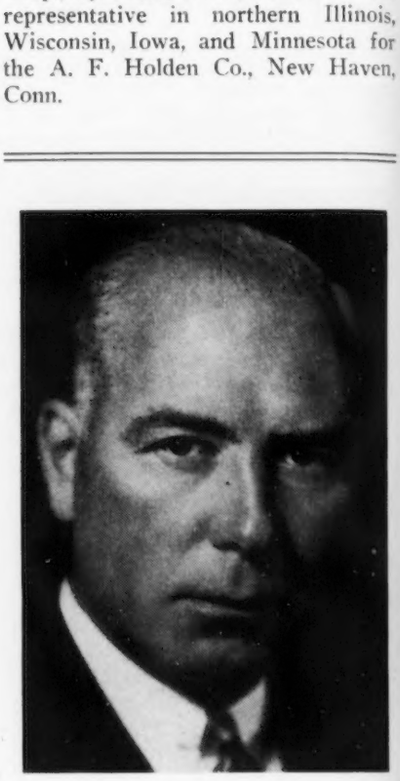
J. L. STONE, who has been metallurgist for the Masillon, Ohio, plant of the Union Drawn Steel division of Republic Steel Corp., Cleveland, has been appointed field metallurgist for the company's Hartford, Conn., sales district. He was graduated from Case School of Applied Science in 1931 and was previously on the metallurgical staff of Republic's Central Alloy division.

❖ ❖ ❖

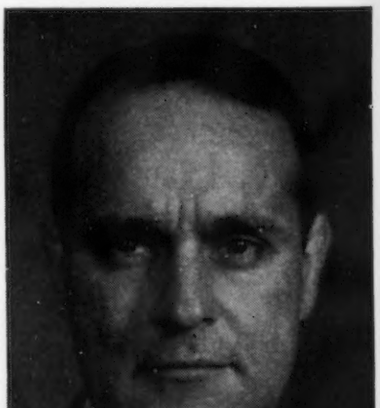
GERALD D. HOWK has been appointed mill representative in the Cincinnati territory for the Ludlum Steel Co., Watervliet, N. Y. His headquarters will be in the offices of Julius Uihlein & Co., 208 Elm Street, Cincinnati. He will also assist the Uihlein firm in servicing the Ludlum products regularly handled by them.

❖ ❖ ❖

J. B. CAREY, formerly chief metallurgist for the New Process Gear Corp., Syracuse, N. Y., has been made representative in northern Illinois, Wisconsin, Iowa, and Minnesota for the A. F. Holden Co., New Haven, Conn.



P. B. BURTIS (above) and C. M. Mackall (below), who have been appointed manager and assistant manager of sales respectively for the Bethlehem Steel Co. in the Philadelphia district. Biographical sketches appeared in these columns last week.



PORTER B. CHASE, president of the Sesamee Lock Co., Hartford, associating with HOWARD A. LINCOLN, Springfield, Mass., has acquired a controlling interest in the Bemis & Call

Co., Springfield, manufacturer of wrenches. The Bemis plant has not been operated recently and it is planned to resume production within a short time. Mr. Chase is president and treasurer, Mr. Lincoln, vice-president, and John C. Beggs, who was employed at the plant for 49 years, is assistant treasurer and member of the board of directors.

❖ ❖ ❖

A. BAIR BASSOFF, formerly consulting engineer for the Sier Bath Co., New York, and prior to that production manager of the Worth Steel Co., Claymont, Del., has been appointed general manager of the Atlantic Gear Works, New York. RICHARD BEERS

PHIL HUBER, president of the Ex-Cel-O Corp., Detroit, whose appointment as a director of the National Machine Tool Builders' Association, was noted in these columns last week.

has been named works superintendent, and C. DAHLERUP will continue as general superintendent.

❖ ❖ ❖

J. HOMER PLATTEN has been made comptroller of the American Car & Foundry Co., New York, and will continue to serve as executive assistant to the president.

❖ ❖ ❖

PAUL C. POCOCK, sales manager of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, sailed recently for Europe on a six to eight weeks' business trip.

❖ ❖ ❖

WILLIAM C. CONNELLY, president of the Ohio Seamless Tube Co., Shelby, Ohio, has been elected a di-

Don't overlook SPRINGS
when you modernize your mechanisms

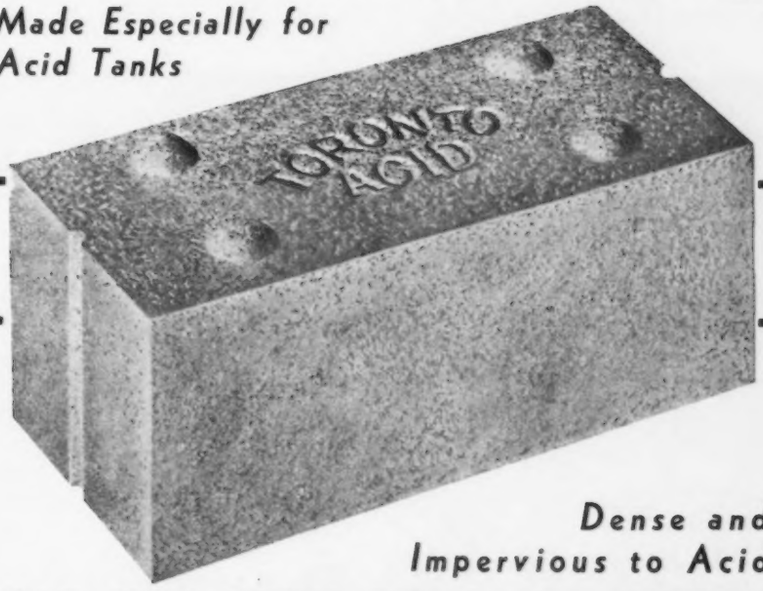
Why continue to use the same old spring in your redesigned motions without investigating the possibilities of increased performance from this part, also? Gibson metallurgists are continually prying into the characteristics of new spring materials to determine their full range of usefulness and suitability. This information, plus an ability to put it to practical use, has proved interesting and profitable to manufacturers of a great variety of products using springs. The size of your order is no bar to obtaining quality springs. Gibson puts the same effort into small orders as into quantity runs.

SPRINGS
SMALL STAMPINGS
WIRE FORMS

WILLIAM D. GIBSON COMPANY
DIVISION OF ASSOCIATED SPRING CORPORATION
1800 CLYBOURN AVE. : : : CHICAGO, ILL.

GIBSON-SPRINGS

TORONTO ACID BRICK
Made Especially for Acid Tanks



Dense and Impervious to Acid

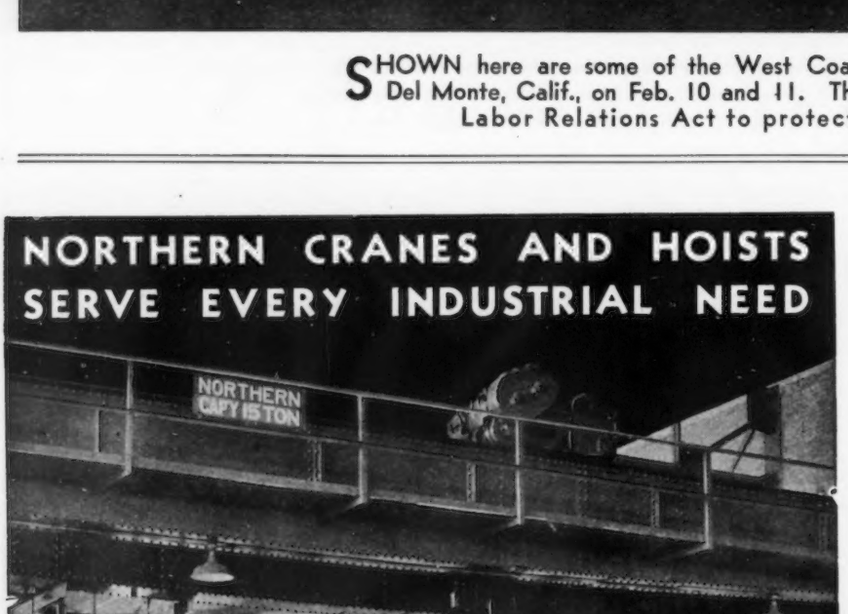
FOR USE WITH BASOLIT CEMENT

Toronto Acid Brick are designed for use with Basolit, the acid-proof cement joint. Accurate spacing buttons and end grooves insure uniform self-anchoring joints at low labor costs for laying up tank walls and floors. Precisely moulded, repressed and deaerated, Toronto Acid Brick are made in stock and special shapes. Send for samples and further information.

THE KEAGLER BRICK COMPANY
STEUBENVILLE, OHIO

Fire Clay, Acid Resistant Brick, Fire Clay Mill Brick, Pickling Tank Linings, Acid Proof Construction, Paving Brick, Paving Block, Chimney Stack Brick.

SHOWN here are some of the West Coast business men who attended the 14th an... Del Monte, Calif., on Feb. 10 and 11. They heard Tom M. Girdler, chairman of Rep... Labor Relations Act to protect employees from coercion by labor leaders,



rector of the National Screw & Mfg. Co., Cleveland. WILLIAM A. McAFFEE, Cleveland attorney, has also been elected to the board.

❖ ❖ ❖

MARSHALL A. SMITH, JR., formerly in charge of sales and engineering of the Industrial fan division of the Bendix Products Corp., has been made president and general manager of the South Bend Air Products, Inc., South Bend, Ind., which has taken over the ventilating equipment business formerly handled by the Bendix industrial fan division. Before going with the Bendix Aviation Corp. in 1929, Mr. Smith was chief of the aircraft propeller unit of the engineering division of the U. S. Army Air Corps at Dayton, Ohio.

❖ ❖ ❖

JOSEPH C. LANG, formerly works manager, Automatic Business Machines, Inc., Pittsburgh, has resigned to become chief engineer of Brooke L. Jarrett & Co., industrial engineers, Pittsburgh. He was at one time associated with the National Cash Regis-

nference of Iron, Steel and Allied Industries of the California State Chamber of Commerce at eel Corp., condemn price reductions as a way to recovery, urged amendment of the Wagner opted a resolution opposing the 70-car train limit bill now pending before Congress.

ter Co. and with the Remington Rand, Inc., as designing engineer.

❖ ❖ ❖

AUGUST J. LUEDKE, secretary and treasurer of the Milcor Steel Co., Milwaukee, has resigned and will devote his time to other extensive interests after spending four to five months in travel and recreation. ELMER L. LIPMAN has been appointed to fill the unexpired term of secretary-treasurer. Mr. Luedke joined the company when it was founded 32 years ago by his late father and other local interests as the Milwaukee Corrugating Co. The Milcor company later became a unit of the Inland Steel Co., Chicago.

❖ ❖ ❖

ROBERT SERGESON, for the past eight years director of the metallurgical laboratory for the Canton and Massillon plants of Republic Steel Corp., has joined the staff of the Crucible Steel Co. of America as chief metallurgist of its Park works in Pittsburgh. Graduating from the University of Pennsylvania in chemical en-

(CONTINUED ON PAGE 95)

PRESSES • DIES • METAL-FORMING MACHINERY
FABRICATING MACHINERY
PUNCHES • SHEARS • SPACING TABLES

New 3-point Gib Design...
accurate tool Alignment
This new exclusive feature, together with Patented Safety Clutch, gives the user of Improved Thomas Inclinable Power Presses better stampings with lower tool costs and minimum upkeep! Write for new catalog showing complete line of Thomas Presses for any purpose.
THOMAS
MACHINE MANUFACTURING COMPANY
Name changed from Thomas Spacing Machine Co.
PITTSBURGH, PA.
BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

Wire Drawing

(CONTINUED FROM PAGE 29)

much simpler process of rotating the wire itself during the drawing is more generally employed.

At low speeds of drawing there is a remarkable reduction in the tension required to draw the wire if the die is rotated; using 17 per cent nickel-silver, the pull is reduced from 73 lb. with a stationary die to 27 lb. with one rotated at 160 r.p.m. It has already been pointed out, however, that it is highly unsafe to assume that what holds true for very low speeds of drawing will also apply at those speeds employed commercially. As the speed of drawing is increased, the tension required with the rotating die increases rapidly, and above a certain speed actually becomes greater than that for a stationary die. Except, therefore, at such low speeds of drawing as are associated with draw-bench work, there is no power economy to be obtained by the rotation of the die, but it is worth while pointing out that the surface of the wire so produced is in a highly burnished condition. So far as the few tests go which have been made on the mechanical properties of wires drawn through stationary and rotating dies, no difference has so far been detected.

When a backward pull is applied to wire being drawn through a die, the direct tension required increases in direct proportion to, but at a lower rate than, the back pull. The resultant force acting on the die, however, decreases somewhat rapidly as the backward pull is raised, to such an extent that in some cases it is quite easy to push the die along the wire by hand, even when a reduction of area of 20 per cent or more is being effected. A rotary motion of the die at the same time greatly facilitates the operation. The author believes that advantage has been taken of this effect in certain American plants. There is some possibility, however, that at any rate in the case of steel wire, the ductility of the material may be distinctly less when a backward pull is deliberately applied than when the same material is drawn in a more normal manner.

Although, as has already been said, this paper is concerned with the wire-drawing process itself rather than with the effect of the process on the mechanical properties of the product, there is one aspect of the latter which is sufficiently interesting to justify attention here. It was first pointed out by Alkins that if the tensile strength of copper wire was plotted against the reduction of area in the drawing, a kink was observed at a reduction of area round about 50 per cent, in which zone the tensile strength increased at a comparatively low rate. This effect has now been observed in several materials, all of which, however, crystallize in a face-centered cubic lattice. In an attempt to determine whether the same effect was to be observed with plain carbon steels, several steels have been drawn down with a wide range of reduction of area extending beyond 90 per cent, without however the slightest sign of a break being observed. It would appear, therefore, that this effect is connected with some specific form of deformation of the face-centered cubic lattice, and further work in this direction is going on.

It has been shown recently that, at any rate qualitative agreement is to be observed between the macro-structure of worked metals and the streamline picture obtained in the Hele-Shaw apparatus. The application of the apparatus to the drawing of wire has led to results, not yet publicized, which demonstrate very strongly that a fairly close picture of the nature of the flow of the metal can be obtained in this way. One particular result of this work may be dealt with here. It is generally agreed by the drawers of steel wire that the presence of inclusions in the material is a frequent cause of trouble. The intensely hard particles of alumina found in steel deoxidized with aluminum are known to score the die badly and to make the drawing of wire of accurate gage difficult. The lateral pressure at any point is proportional to the relative distance between successive lines and it will be seen that marked compression has occurred around the inclusions. It follows therefore that such inclusion may exert a very harmful effect on the surface of the die, even if they are underneath the actual surface of the metal being drawn. Around such inclusions the pressure on the die would appear to be markedly increased. It is not surprising, therefore, that there is some reason to believe that the mechanical properties obtained from very "dirty" steel are, for this reason, if for no other, inferior to those obtained from a metal which is essentially free from included matter.

General Electric Signs Agreement With CIO Affiliate

GENERAL ELECTRIC CO. has signed an agreement granting the United Electrical, Radio and Machine Workers of America, a CIO affiliate, sole collective bargaining rights in each of its 15 plants where a majority of employees designates the CIO union as bargaining agent.

National Labor Board elections or proofs of membership can be used to establish the CIO union as bargainer, according to the agreement, which will run one year with automatic renewal thereafter unless either side gives 90 days notice of cancellation.

The General Electric contract also (a) prohibits strikes, lockouts and company unions, (b) provides arbitration of unsettled grievances, (c) commits the company to paying wages "equal to or higher than wage rates paid in community industries in comparable work," (d) establishes the 40-hr. week, (e) and provides automatic wage increases in the event of living cost increases as gaged by the quarterly index of the United States Department of Labor.

Blaw-Knox Puts Up Steel House in Week

SIX workmen have just completed within one week an experimental all-steel prefabricated house at Clairton, Pa., at a cost of about $4,000, according to engineers of the Blaw-Knox Co., Pittsburgh.

The dwelling's concrete block foundations were constructed in one day, the walls, rafters and roof the next two days, windows and plumbing fixtures the following two days and decorations the sixth day.

Four rooms, a kitchen-dinette, two bedrooms, a living room, plus a bath and utility room for the furnace and laundry is included in the structure which is one of 20 available designs.

Other steel houses are to be built near Carnegie-Illinois Steel Corp.'s Irvin works, near Pittsburgh.

...OBITUARY...

HOWARD S. STEBBINS, prominent in the iron ore business in Cleveland for many years, died Feb. 17 in Clermont, Fla., aged 75 years. Born in Masonville, N. J., he went to Cleveland as a boy. He was associated with Oglebay, Norton & Co. until 1915, was then ore sales representative for the M. A. Hanna Co. 16 years, retiring in 1931. Mr. Stebbins was a former treasurer of the Lake Superior Iron Ore Association.

❖ ❖ ❖

LINDSAY H. WALLACE, retired shipyard executive and son of the late Robert Wallace, former president of American Shipbuilding Co., died Feb. 14 in Cleveland.

❖ ❖ ❖

CHARLES R. DIXON, retired senior engineer of the U. S. Engineers Office, died Feb. 18 at his home in Detroit, following a heart attack. Born at Niles, Mich., in 1864, he was graduated from the Engineering School of the University of Michigan in 1887 and entered the government engineering service in 1892 at Sault Ste. Marie, Mich., moving to Detroit in 1913. Mr. Dixon supervised much of the channel and harbor improvements from the Soo to Marblehead, Ohio, and had charge of the construction of the Livingstone Channel at the mouth of the Detroit River. He retired in May, 1936. Mr. Dixon was president of the Detroit Engineering Society in 1918 and was a life member of the American Society of Civil Engineers.

❖ ❖ ❖

H. O. FLEISCHMAN, operator of the Central Brass Foundry, Toledo, Ohio, died Feb. 16 after a short illness, at the age of 59.

❖ ❖ ❖

L. I. CORTHELL, formerly engineer for the National Tube Co., Lorain, Ohio, who helped construct the Lorain plant in 1894, died in Stuart, Fla., Feb. 16, aged 70 years. He had been retired for a number of years.

❖ ❖ ❖

GEORGE A. JOHNSON, president of Ashland Malleable Iron Works, Ashland, Ohio, died Feb. 13 at Jacksonville, Fla., aged 73 years.

❖ ❖ ❖

EDWIN F. BORNEMAN, purchasing agent for Graham-Paige Motors Corp. for 21 years, died Feb. 16. Mr. Borneman was a native Detroiter, born Aug. 14, 1897.

❖ ❖ ❖

FRANK E. TUCKER died Feb. 14 at Wyandotte, Mich. Born in St. Thomas, Ontario, 66 years ago, he had lived in Wyandotte for 50 years. For the last 34 years he was superintendent of the machine and blacksmiths' department of the Michigan Alkali Co., retiring last June.

❖ ❖ ❖

FRED W. RINSHED, president of the Rinshed - Mason Co., Detroit, died Feb. 15 of pneumonia. He was born in Detroit in 1881. After working for the Schroeder Paint & Glass Co., he organized the Rinshed-Gagnier Co. and later built up a color manufacturing business called the Rinshed - Mason Co., which served the automobile industry.

❖ ❖ ❖

ISAAC F. BAKER, for more than 35 years general superintendent of the Lynn, Mass., works of the General Electric Co., died at his home in that city on Feb. 17. He retired from business seven years ago.

Mr. Baker was born in Birmingham, England, 87 years ago, was graduated from the Birmingham School of Arts, came to this country as a young man, and in 1883 became associated with the Thomson - Houston Co., which later became a part of the General Electric Co. Mr. Baker was noted for settling labor disputes and had helped formulate an employees' representation plan.

PAGE
HI-TENSILE
"F"
means a Better Profit!

Come out with the right cost figures on your welding jobs. Get speed—and perfect welding—with Hi-Tensile "F". Use this one electrode for the right results on a wide range of work.

Hi-Tensile "F" is just what you want for high-speed, single-pass work—just what you need for the welding of Cromansil, Cortan, H-T50 and many more of the new alloy steels. Hi-Tensile "F" gives you assured economy through its high speed, its easy handling qualities, its exceptionally low spatter and slag losses.

Whether your work is production, maintenance or construction, see your local Page distributor.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE COMPANY, Inc.
MONESSEN, PENNSYLVANIA

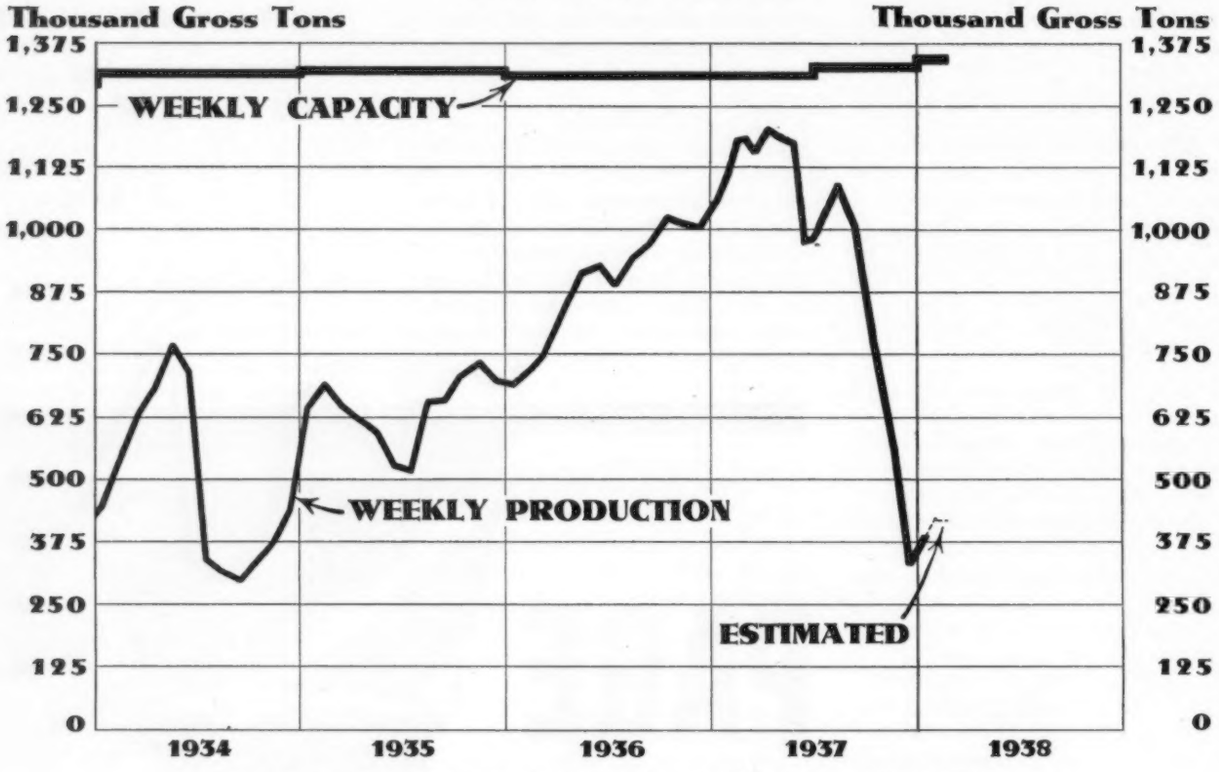
In Business for Your Safety

ACCO

PAGE *Welding* WIRE

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1938



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	28.0	29.0
Chicago	25.5	25.0
Valleys	30.0	28.0
Philadelphia	29.0	29.0
Cleveland	25.0	27.0
Buffalo	20.5	18.0
Wheeling	48.0	62.0*
Southern	43.5	48.0
Ohio River	31.5	31.5
Western	30.0	40.0
St. Louis	27.0	29.5
Detroit	39.5	42.5
Eastern	50.0	50.0
Aggregate	30.0	31.0

* Revised.

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Feb. 21, 1938	Feb. 15, 1938	Jan. 25, 1938	Feb. 24, 1937	1938	1937
Fabricated structural steel awards	12,770	6,255	12,550	12,350	94,175	218,445
Fabricated plate awards	2,650	2,855	360	870	20,695	26,420
Steel sheet piling awards	210	0	1,815	2,020	2,605	12,550
Reinforcing bar awards	8,375	1,765	845	5,200	37,420	30,815
Total Lettings of Construction Steel	24,005	10,875	15,570	20,440	154,895	288,230

. . . .SUMMARY OF THE WEEK. . . .

▼ ▼ ▼

. . . Prices announced for second quarter by all companies.

o o o

. . . Quotations unchanged except for adjustments on some flat rolled products.

o o o

. . . Business has shown only minor improvement.

CLARIFICATION of the steel price structure, which many buyers have been awaiting, has not aided business broadly, although a few companies have had the best volume of orders in weeks. Improvement has not been sufficient to raise the steel ingot production rate for the industry as a whole, since some plants have recently been making raw steel in excess of finishing mill requirements.

Following the action of the Carnegie-Illinois Steel Corp. in continuing current prices through the second quarter, other steel companies have made like announcements, which cover virtually all products except tin plate, on which the present price is effective until Sept. 30, and pipe, on which quarterly announcements are not made. Nearly all producers have extended present quotations on pig iron through the next quarter.

All steel makers recognized in their price statements the recent reduction of $4 a ton on cold-rolled sheets. To iron out an ensuing maladjustment in differentials on related flat-rolled products, pickling extras on hot-rolled annealed sheets have been reduced $1 and $2 a ton, depending upon the gage, and base prices of commodity cold-rolled strip, used mostly by the automobile industry, have been lowered $2 a ton. Pickling extras on hot-rolled sheets are $1 a ton lower on Nos. 17 and 18 gages and $2 a ton lower on Nos. 19, 20, 21 and 22 gages.

STEEL ingot output is estimated at 30 per cent for this week, off one point from last week. Operating rates by districts again emphasize the erratic character of buying. Only in two important districts has there been an increase, the Valleys being two points higher at 30 per cent and the Buffalo district two and a half points higher at 20½ per cent. The Pittsburgh district is down one point, Chicago down a half point, Cleveland-Lorain is two points lower, while the Wheeling-Weirton area, where capacity has been employed to build up stocks, has shown the sharpest drop, from 62 to 48 per cent.

Now that the questions of wages and prices have been at least temporarily removed as business deterrents, attention is focused on the possible stimulus that may result from an increase in railroad freight rates. Possibly in anticipation of an early decision by the Interstate Commerce Commission, some of the railroads have issued inquiries for rails and track accessories, notably the Santa Fe, Illinois Central, North Western and Rock Island roads.

IN searching for all possible sources of encouragement, the steel industry may be prone to place too high hopes on railroad buying, but the fact remains that it offers the most tangible prospect for the near future. Assuming that some plan is worked out at Washington whereby the weak roads will be afforded financial aid through the Reconstruction Finance Corp., or by some other means, equipment building may soon take a turn upward. The Union Pacific, for example, has announced resumption of work on 1700 cars, to be built in its own shops, of an original program of 2600 cars, while the Western Pacific has applied to the Interstate Commerce Commission for permission to borrow $3,600,000 for building and repairing 400 cars and for other expenditures, including purchase of rails. The Burlington has ordered 100 ballast cars, the New Haven has ordered 10 Diesel-Electric locomotives and 50 passenger cars and has received permission to buy 7580 tons of rails, and the Interborough Rapid Transit Co., New York, may buy 50 subway cars.

Although some of the increased business of the past week in steel emanated from automobile companies, not much improvement in purchases by that industry is expected immediately, despite rising motor car production, because of inventories that are still excessive. In industry generally, steel is being consumed at a rate faster than it is being produced. One large steel company, for example, in a survey among its larger customers, found that some were operating up to 60 per cent, or double the steel rate.

With spring just around the corner, building construction, usually affected by the approach of the outdoor season, is experiencing no upturn, so far as lettings of structural steel reflect the situation. Of 13,000 tons in awards, 6200 tons is for a railroad grade crossing job at Lynbrook, N. Y. New projects of nearly 14,000 tons include two buildings for the New York World's Fair, one of 1800 tons and one of 1100 tons.

Steel scrap has declined 50c. a ton at Chicago, bringing THE IRON AGE composite price down to $13.67.

. . . PITTSBURGH . . .

. . . Most prices reaffirmed for second quarter delivery.

o o o

. . . Commodity cold rolled strip off $2; sheet extras lowered.

o o o

. . . Clarification of price situation has not yet aided business.

PITTSBURGH, Feb. 21.—The reaffirmation of present steel prices for second quarter delivery is expected to result in more activity than has been present during the past few weeks. As anticipated, Carnegie-Illinois Steel Corp. reaffirmed present prices on all hot rolled products and the recent price change in cold rolled sheets will also remain in effect for second quarter delivery. Pickling extras on certain gages of hot rolled annealed sheets have been revised in order to maintain a differential between this product and cold rolled sheets. Prices on wire products have been reaffirmed, but commodity cold rolled strip has been revised downward $2 a ton to conform with the recent change in the price of cold rolled sheets. Cold drawn bar quotations have been reaffirmed for second quarter. Local pig iron producers have named present quotations for second quarter delivery.

The volume of incoming business during the past week has shown little, if any, change from the previous week. Some orders which were held up pending price clarification, are expected momentarily but no sharp increase in sales is anticipated. Hand-to-mouth purchases continue with little likelihood of any change in this method of buying for some time.

Steel ingot production in the Pittsburgh district is off one point to 28 per cent of capacity and the Wheeling-Weirton district is off 14 points to 48 per cent of capacity. The drop in the latter district rate is due to the taking off of a bessemer converter and some open hearths which had previously been making stock.

Pig Iron

Pig iron producers have reaffirmed present prices for second quarter delivery. New business so far this month is slightly ahead of that done in the corresponding January period. Jobbing foundries are slightly more active but all buying continues on a strictly hand-to-mouth basis.

Semi-Finished Steel

The action of the leading interest in reaffirming present prices for second quarter delivery has been followed by other steel makers. Price clarification is expected to result in slightly better activity. New business during the past week was on a par with that of a week ago.

Bars

Prices on hot rolled bars for second quarter delivery will be unchanged from present quotations. Total bar business was off slightly during the past week but, in view of the lack of automotive buying, current bookings are no worse than was anticipated.

Tin Plate

Little change in tin plate demand has materialized during the past week. There is a little more activity in business from miscellaneous users. Operations this week may be estimated at between 43 to 45 per cent.

Sheets and Strip

Current base prices of hot and cold rolled sheets have been reaffirmed for second quarter delivery. A leading producer has revised pickling extras on certain gages of hot rolled annealed sheet in order to maintain a certain differential between these products and the cold rolled item. Changes in pickling extras are as follows: 17 and 18 gage reduced from 25c. to 20c. a 100 lb.; 19 and 20 gage from 30c. to 20c. a 100 lb.; 21 and 22 gage from 35c. to 25c. a 100 lb. Hot and cold rolled strip steel prices have been reaffirmed for second quarter delivery with the exception of cold rolled commodity strip, which has been revised downward $2 a ton to conform with the recent change in cold rolled sheet prices.

Wire

First quarter prices on wire products have been reaffirmed for second quarter delivery by a leading maker. This action is expected to bring in some business which has been held up pending clarification of second quarter prices. Total wire business so far this month is ahead of that booked during the same period in January. A continuation of the recent increase in wire business is expected in view of seasonal requirements.

Tubular Goods

Oil-country goods specifications were in slightly better volume during the past week but tonnages involved are still small. No price announcements have been made on tubular products as these are not sold on a quarterly basis. However, producers would be willing to book tonnages for second quarter delivery at today's prices.

Reinforcing Bars

The leading producer has reaffirmed present prices for second quarter delivery. New business during the past week has declined slightly and, although awards have been fairly substantial, the number of new projects coming up is somewhat smaller than was the case a month ago. Rosslyn Steel & Cement Co., Washington, was awarded the contract for the National Gallery of Art, Washington, requiring 1100 tons. Ceco Steel Products, Omaha, will furnish 1200 tons of bars for an incinerator building at Detroit.

Plates and Shapes

Prices on structural plates and shapes will be unchanged for second quarter delivery. Specifications are in less volume than a week ago but structural inquiries are more numerous. American Bridge Co., Pittsburgh, was awarded the contract for 6200 tons of plates and shapes for a grade crossing elimination at Lynbrook, N. Y.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Feb. 21, 1938	Feb. 15, 1938	Jan. 25, 1938	Feb. 24, 1937
Rails, heavy, at mill	$42.50	$42.50	$42.50	$39.00
Light rails, Pittsburgh	43.00	43.00	43.00	38.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	34.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	34.00
Slabs, Pittsburgh	37.00	37.00	37.00	34.00
Forging billets, Pittsburgh	43.00	43.00	43.00	40.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	43.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.20
Bars, Chicago	2.50	2.50	2.50	2.25
Bars, Cleveland	2.50	2.50	2.50	2.25
Bars, New York	2.79	2.79	2.79	2.55
Plates, Pittsburgh	2.25	2.25	2.25	2.05
Plates, Chicago	2.30	2.30	2.30	2.10
Plates, New York	2.54	2.54	2.54	2.33
Structural shapes, Pittsburgh	2.25	2.25	2.25	2.05
Structural shapes, Chicago	2.30	2.30	2.30	2.10
Structural shapes, New York	2.5125	2.5125	2.5125	2.3025
Cold-finished bars, P'gh	2.90	2.90	2.90	2.55
Hot-rolled strips, P'gh	2.40	2.40	2.40	2.15
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.85
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.80
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.90
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.40
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.50
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	2.15
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.25
Cold-rolled sheets, No. 20, Pittsburgh	3.45	3.45	3.55	3.25
Cold-rolled sheets, No. 20, Gary	3.55	3.55	3.65	3.35
Wire nails, Pittsburgh	2.75	2.75	2.75	2.50
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.55
Plain wire, Pittsburgh	2.90	2.90	2.90	2.60
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.65
Barbed wire, galv., P'gh	3.40	3.40	3.40	3.05
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	3.10
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$4.85

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Feb. 21, 1938	Feb. 15, 1938	Jan. 25, 1938	Feb. 24, 1937
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$23.76
No. 2, Valley furnace	24.00	24.00	24.00	22.00
No. 2, Southern Cin'ti	23.89	23.89	23.89	21.69
No. 2, Birmingham†	20.38	20.38	20.38	18.38
No. 2, foundry, Chicago*	24.00	24.00	24.00	22.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	23.26
Basic, Valley furnace	23.50	23.50	23.50	21.50
Malleable, Chicago*	24.00	24.00	24.00	22.00
Malleable, Valley	24.00	24.00	24.00	22.00
L. S. charcoal, Chicago	30.24	30.24	30.24	27.54
Ferromanganese, seab'd carlots	102.50	102.50	102.50	80.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$14.00	$14.00	$14.25	$20.75
Heavy melting steel, Phila.	14.75	14.75	14.75	18.75
Heavy melting steel, Ch'go	*12.25*	12.75	13.00	20.25
Carwheels, Chicago	*14.00*	15.00	15.50	19.50
Carwheels, Philadelphia	15.25	15.25	16.25	18.50
No. 1 cast, Pittsburgh	16.25	16.25	16.25	17.75
No. 1 cast, Philadelphia	15.75	15.75	16.75	19.25
No. 1 cast, Ch'go (net ton)	*11.75*	12.25	12.50	17.00
No. 1 RR. wrot., Phila.	15.25	15.25	16.25	18.75
No. 1 RR. wrot., Ch'go (net)	9.75	10.25	10.75	18.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$4.00	$4.25
Foundry coke, prompt	5.00	5.00	5.00	4.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	10.00	10.00	10.25	15.00
Lake copper, New York	10.125	10.125	10.625	15.125
Tin, Straits, New York	**41.875**	41.25	41.00	54.75
Zinc, East St. Louis	4.75	4.75	5.00	6.80
Zinc, New York	5.10	5.10	5.35	7.15
Lead, St. Louis	4.35	4.35	4.75	6.35
Lead, New York	4.50	4.50	4.90	6.50
Antimony, Asiatic, N. Y.	**15.875**	15.75	15.625	16.00

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Feb. 21, 1938	2.605c. a Lb.	$23.25 a Gross Ton	$13.67 a Gross Ton
One week ago	2.605c.	23.25	13.83
One month ago	2.605c.	23.25	14.00
One year ago	2.330c.	21.25	19.92
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1938					$14.00, Jan. 4	$13.67, Feb. 21
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

REINFORCING STEEL

. . . *Awards of 8375 tons—4555 tons in new projects.*

AWARDS

Bristol, R. I., 100 tons, school, to Concrete Steel Co., New York.

New York, 150 tons, Treasury Department, to W. Ames & Co., Jersey City.

State of New Jersey, 225 tons, highway projects, Sussex and Warren Counties, to Igoe Brothers, Newark, N. J.

Baltimore, 156 tons, State Purchasing Bureau, to Maryland Steel Products, Baltimore.

Washington, 2000 tons, Mellon Art Gallery: 1180 tons to Republic Fireproofing Co., Inc., New York; 820 tons to American Steel Engineering Co., Philadelphia.

Washington, 1100 tons, National Gallery of Art, to Rosslyn Steel & Cement Co., Washington.

Washington, 675 tons, Chevy Chase Park and shop stores, to Hudson Supply & Equipment Co., Washington.

Detroit, 1200 tons, sludge incinerator building, to Ceco Steel Products, Omaha.

Cleveland, 100 tons, school at Cuyahoga Falls, to Republic Steel Corp., Cleveland.

Chicago, 140 tons, sanitary district sewer, to Joseph T. Ryerson & Son, Inc., Chicago.

East Moline, Ill., 100 tons, high school, to Calumet Steel Co., Chicago.

State of Iowa, 325 tons, paving work, to Sheffield Steel Corp., Kansas City, Mo.

Vernon, Cal., 850 tons, Swift & Co. packing plant; project reported abandoned.

San Francisco, 103 tons, roadway on Yerba Buena Island for United States Engineer, to Soule Steel Co., San Francisco.

Blaisdell, Ariz., 1136 tons, Gila project (Invitation 24605A), to Bethlehem Steel Co., Los Angeles.

Pueblo, Colo., 100 tons, sewage disposal plant, to Midwest Steel & Iron Co., Denver.

Honolulu, T. H., 138 tons, harbor oil line, to Laclede Steel Co., St. Louis.

NEW REINFORCING BAR PROJECTS

Bridgeport, Conn., 100 tons, court house addition.

Westport-Fairfield, Conn., 370 tons, seven State bridges.

New York, 370 tons, northerly unit, Flushing River bridge; bids until March 3 by Department of Public Works.

Brooklyn, 190 tons, Meeker Avenue bridge approaches; C. F. Vachris, Inc., Brooklyn, low bidder.

Washington, 100 tons, National Cash Register building.

Chicago, 1040 tons, Sears, Roebuck & Co. retail store.

Springfield, Ill., 100 tons, junior department economics and dormitory building; bids Feb. 26.

Clarksville, Mo., 565 tons, dam No. 24; Central Engineering Co., Davenport, Iowa, low bidder on general contract.

Palo Pinto County, Tex., 4500 tons, Possum Kingdom dam and power house; bids Feb. 24.

Jefferson City, Mo., 320 tons, State office building; Lehr Construction Co., St. Joseph, Mo., general contractor.

Jefferson City, Mo., 100 tons, power house at Missouri State Prison; McCarthy Brothers Construction Co., St. Louis, general contractor.

St. Louis, 190 tons, addition to bottling plant of Griesedieck Brothers Brewery Co.; Woermann Construction Co., St. Louis, general contractor.

Olympia, Wash., 188 tons, highway projects in Stevens, King, and Skamania Counties, Wash.; bids March 1.

Hastings, Neb., 615 tons, Nebraska Public Power and Irrigation District projects; bids March 4.

Homedale, Idaho, 100 tons, Owyhee project; bids opened.

Mare Island, Cal., 289 tons, paint and oil warehouse at Navy Yard; bids opened.

Los Angeles, 300 tons, United States Immigration Station; Sarver & Zoss, Los Angeles, general contractors.

Omaha, 600 tons, Central Nebraska Public Power and Irrigation District.

..SAN FRANCISCO..

. . . *Steel awards more numerous; no large jobs.*

SAN FRANCISCO, Feb. 21.—No outstanding awards were made here this week, although the number of medium-sized and small projects was the largest in some time.

Water works projects in the Pacific Northwest continue to require sizable quantities of cast iron and steel pipe. Construction now under way in the Seattle area will require more than 2600 tons of cast iron pipe and an equal quantity of steel pipe. Plate awards totaling 800 tons were made in the same area during the week, and more than 1000 tons is expected to be required for ringseal gates and conduit linings for Grand Coulee Dam, on which bids are asked March 31.

Reaffirmation of prices for the second quarter of 1938 will bring a number of buyers into the market who had delayed purchases in hopes of a reduction, steel men here believe.

Moore Dry Dock Co., Oakland, is low bidder on a 288-ton caisson gate for the Mare Island, Calif., Navy yard. This firm also received the award for construction of a small freight vessel.

....BUFFALO....

. . . *One open hearth added at Bethlehem plant.*

BUFFALO, Feb. 22.—Spotty operation characterizes steel rolling schedules, though the net result of an increase in miscellaneous orders, including some pickup in demand from the automobile industry, has been the addition of one open hearth to the active list. Bethlehem's Lackawanna plant now is operating six furnaces instead of the five active for the past month. Republic Steel Corp. continues with two and Wickwire-Spencer Steel Corp. one. Bethlehem's strip mill operated three days last week; Republic halted two bar mills Wednesday, but resumed over the weekend. Wickwire shut down the blooming mill Saturday and started its rod mill.

Pig iron specifications show that nearby foundries are operating two or three days a week. February iron business has been about the same so far as that of January. Indications that inventories are tapering in many consumers' yards are apparent.

. . .CINCINNATI. . .

. . . *New business shows improvement, particularly from automobile industry.*

CINCINNATI, Feb. 22.—Sheet demand held recent gains the past week. Incoming business was equal to about 45 per cent of mill capacity. The week's business revealed one or two encouraging factors. Foreign demand, which accounted for much of the previous week's spurt, was almost nil last week, indicating renewed domestic interest of good proportions. In addition, mill operators were encouraged by the fact that about 40 per cent of the week's bookings was from automotive sources, thus bringing this industry to its normal proportion of total demand. In fact, the leading district interest reports that the bulk of improvement is attributable to renewed motor car specifications. A slight improvement in mill operations is reported to keep rolling schedules on a parity with new bookings.

Steel making is unchanged. Ten open hearths out of 34 are in operation.

The pig iron market is sluggish. Here and there small lot orders are reported, but the totals are not impressive.

. . . . CHICAGO . . . .

. . . No appreciable increase in buying follows price announcements.

o o o

. . . Railroads, anticipating rate increase, inquire for rails and accessories.

o o o

. . . Steel operations up slightly; scrap prices lower.

CHICAGO, Feb. 21.—Although one mill cut operations nearly 15 per cent from last week, an increase at the plant of another producer was sufficient to offset this loss and result in a net gain of one-half point to 25½ per cent of capacity.

Sales and specifications this week are reported about equal to those received over the past three weeks. One sales office, however, is running about 30 per cent ahead of January thus far this month, most of the increase coming from farm implement makers and jobbers, bars being the chief product to benefit. Automobile demand is no better, nor is that of the railroads, although an increase in inquiries from the latter has been noticed, which is thought to be because of the likely freight rate increase.

A noticeably better feeling is being expressed in this district following last week's price reaffirmations, which action was followed today by leading pig iron interests here. No result in orders for steel has yet been noticed, but it is expected that many buyers whose inventories were allowed to fall below the safe level because of price uncertainties will return to the market within a short time.

Inventories of many farm equipment manufacturers were especially low, it is understood, and these plants are expected to be among the first to place further business.

An unnamed railroad has placed about 6000 tons of rails here, and several other roads are about to enter the market, according to comment in the trade. Inquiries for rails or accessories have been received from the Santa Fe, Illinois Central, North Western and Rock Island.

An optimistic note is seen in the Stewart-Warner Corp. announcement that since Jan. 8 more than 1000 workers have returned to their jobs because of the doubling of the company's production of automobile heaters in 1938 and other operating improvements.

Scrap prices have declined further, heavy melting steel being quoted at $12 to $12.50.

Pig Iron

Prices here have been reaffirmed for second quarter delivery, thus adding to the general feeling now becoming prevalent of an increased stability in conditions. Shipments are little improved, however, either in foundry coke or in iron, although the former is temporarily in heavier demand.

Structural Shapes and Reinforcing Bars

Improvement in these products is hardly noticeable. Small projects that keep fabricators occupied but not busy constitute most of this market's activity in these lines. A Sears, Roebuck & Co. building will require 1040 tons of bars. Central Engineering Co., Davenport, Iowa, is low on the Clarksville, Mo., dam which will take some 4200 tons of metal items, including shapes, plates, anchorages, some machinery and some non-ferrous metals, 570 tons of reinforcing bars and a fair tonnage of sheet piling.

Plates

No new railroad buying has been reported, although the Union Pacific has announced the resumption of a 2600-car building program at three shops, some 1700 cars remaining to be built. Little importance to steel sellers is seen in this decision, however, since the steel for these cars is understood to have been purchased. A considerable number of new inquiries have come in from railroads in expectation of an early announcement of a freight rate increase. How many of these will result in orders is unknown, although a large amount of buying is confidently anticipated by steel companies.

Sheets

No improvement has yet been seen in automobile demand and none is thought likely for several weeks at least. Deliveries are unchanged, three weeks being the maximum wait required for shipment.

Bars

Farm equipment makers' needs are accounting for a slightly increased bar demand. Automobile industry support is still lacking and deliveries continue fairly prompt.

Johnstown Workers Struck To Remove Picket Captain

JOHNSTOWN, Pa.—A departmental sitdown strike called at Bethlehem Steel Co.'s plant here last summer was an attempt to force the removal of a CIO picket captain to another department, four non-union employees revealed at the Labor Board hearing here.

However, only four men out of 240 workers in the same department walked out in the general strike attempted by the CIO, the four witnesses declared. They were called by Bethlehem attorneys to refute charges of alleged discrimination against employees in violation of the Wagner Labor Relations Act.

Rubber Official Forecasts Still More Decentralization

CLEVELAND.—Gradual decentralization of industry, except for certain types such as steel mills which require great concentration of property and men, was predicted at Tiffin, Ohio, Feb. 17 by A. C. Horrocks, educational director for an Akron rubber concern. He addressed a large group of Tiffin students.

Murray's "Inside" Story Of Steel Pact Hits New Dealers

CRITICISM for the Administration at Washington came this week from Philip Murray, SWOC chairman, in what Mr. Murray claimed is the "inside" story of the SWOC's recent contract negotiations with the U. S. Steel Corp.

The Administration, Murray said, sought to establish a steel wage yardstick by which wages would be reduced when steel production fell under 50 per cent and raised when production exceeded that level. The Administration thought, he said, that "this formula would be a Moses to lead us out of the wilderness.

"We could not agree that workers in the steel industry should be tied to a formula that would include immediate wage reductions. We said that we opposed wage cuts because they lowered purchasing power and that there was no precedent to show that following wage cuts there has been immediate recovery. Experience has shown that wage cuts are followed by poverty, misery and even death.

"Steel leaders 11 weeks ago had reason to believe that they would get a wage reduction in the new contract. The reason was the foolish economic policy of the Administration. In New York, Marriner S. Eccles, chairman of the Federal Reserve Board, came out for lower prices and lower wages.

Warned of Cuts' Effects

"We then discussed the fallacious economic theory with Eccles, telling him that if prices were cut and labor forced to absorb these reductions through wage cuts, we should have a depression that would out-Hoover the Hoover depression.

"Despite this conference, Administration leaders continued to advocate this policy. We discussed this for several weeks with the Administration and with the steel leaders in the hope that the advice would be heard and the nation saved. It was then that the industrial leaders suggested this formula. Finally we got a statement from the Administration that it opposed wage cuts, but still recognized the necessity for price reductions. And then last Friday President Roosevelt told newspapermen he was opposed to wage cuts and reduction of prices below the present level.

"That is one reason why we believe the steel contract has checked wage reductions in this country," said Mr. Murray.

(The contract which United States Steel Corp. signed recently with the SWOC gives either side the right to terminate the agreement within 20 days. Wages, hours and other working conditions prevailing in the 1937 contract remain unchanged indefinitely.)

New Negotiations Planned

Meanwhile negotiations for new contracts were expected by the SWOC to get under way this week with Jones & Laughlin Steel Corp., Pittsburgh Steel Co., Wheeling Steel Co. and Crucible Steel Co. of America.

Closed shop agreements have been made by the Federal Enameling & Stamping Co., McKees Rocks, Pa., and John J. Nesbitt Co., Philadelphia, the SWOC said, while the checkoff of union dues, plus a 10 per cent wage increase, are being requested of at least one foundry.

The SWOC reports it has signed contracts with the Exolon Co., Blasdell, N. Y.; Canton Stamping & Enameling Co., Canton, Ohio; the National Enameling & Stamping Co., Granite City, Ill.; the Pittsburgh Screw & Bolt Co.; and has extended agreements from 30 to 90 days with Union Electric Steel Co., East Carnegia, Pa.; Hockensmith Wheel & Mine Co., Penn, Pa.; Seyler Mfg. Co., Pittsburgh, Pa.; Jeannette Steel Corp., Jeannette, Pa.; and Pittsburgh Pipe & Coupling Co., Allison Park, Pa.

COMING CONVENTIONS

Feb. 26—American Electro-Platers' Society, Bradford Hotel, Boston, Andrew W. Garrett, 100 King Street, Dorchester, Mass., is secretary.

March 9—Regional meeting, American Society for Testing Materials, Seneca Hotel, Rochester, N. Y. The society's secretary is C. L. Warwick, 260 South Broad Street, Philadelphia.

March 9 to 12—American Society of Tool Engineers, Machine and Tool Progress Exposition, Convention Hall, Detroit. Ford R. Lamb, executive secretary, 5928 Second Boulevard, Detroit.

March 10 to 11—Aeronautic meeting, Society of Automotive Engineers, Mayflower Hotel, Washington. John A. C. Warner, 29 West 39th Street, New York, is secretary.

March 21 to 25—Western Metal Exposition and Congress, Pan-Pacific Auditorium, Los Angeles, sponsored by the American Society for Metals and 17 other technical societies. Information may be secured from W. H. Eisenman, secretary, A.S.M., 7016 Euclid Avenue, Cleveland.

April 25 to 27—American Gear Manufacturers Association, General Brock Hotel, Niagara Falls, Canada. J. C. McQuiston, secretary, Penn-Lincoln Hotel, Wilkinsburg, Pa.

May 3 to 4—American Steel Warehouse Association, Inc., Waldorf-Astoria Hotel, New York. W. S. Doxsey, 422 Terminal Tower, Cleveland, is secretary of the association.

May 14 to 19—American Foundrymen's Association, annual convention, Cleveland. Secretary of the association is D. M. Avey, 222 W. Adams Street, Chicago.

June 27 to July 21—Annual meeting, American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. C. L. Warwick, 260 South Broad Street, Philadelphia, is secretary of the society.

South Africa to Expand Steel Industry

LONDON (*By Mail*).—Foreshadowing the production of more steel in South Africa, Dr. J. H. Van der Bijl, chairman of the South African Steel Corp., who has just concluded a visit to Britain, says that this is essential because of the great expansion of the country's industries.

Dr. Van der Bijl states that South Africa is at present only making 35 per cent of its steel requirements, although the steel industry is now circulating $25,000,000 annually in the country. South Africa, he claims, has the finest iron ore deposits in the world.

The government is investigating the possibility of increasing the output of steel by the Industrial Steel Corp. in conjunction with the newly-established African Metals Corp., which has a capital of £500,000 ($2,500,000), and of which Dr. Van der Bijl is also chairman.

Modine Mfg. Co., Racine, Wis., has appointed the Paul R. Winston Co., Dallas, Tex., as its representative in the Dallas territory. The Disney-Leffel Co., Inc., has been appointed for the Kansas City area and R. P. Bennett, of the Ace Combustion Engineering Co., Shreveport, La., for the Shreveport territory.

. . . CLEVELAND . . .

. . . Moderate gain in business follows steel price announcements.

o o o

. . . Pig iron prices also extended through the second quarter.

o o o

. . . Operations slightly higher in Valleys, lower in Cleveland.

CLEVELAND, Feb. 21. — Increased open-hearth activity by one company this week has resulted in a two-point gain to 30 per cent for the Ohio Valleys district rate. The Cleveland-Lorain average is down two points to 25 per cent because of a temporary curtailment at one plant.

Moderate improvement in specifications is anticipated following the recent announcements that present base prices on iron and steel will be unchanged for the second quarter. Already some releases definitely held up pending price clarification have been forthcoming.

While there is nothing in the announcements to start a wave of forward buying, it is believed on all sides that reaffirmation was a sensible step at this time. Inventories are now protected and purchasing over the near future may be made with some assurance that base prices are steady.

Attention of industry generally is now centered upon the Interstate Commerce Commission's approaching decision on another freight rate increase. Specifications for the oil fields and for agricultural equipment manufacturers continue to be prominent in the steel industry's incoming business. Automotive parts makers are slightly more active, principally because automobile manufacturers have been gradually depleting some of their parts inventories.

Pig iron producers in this district have reaffirmed their prices for second quarter shipment.

Scrap is quiet, No. 1 heavy melting steel remaining at $12 to $12.50 a ton.

Pig Iron

Spotty improvement is noted in the melt at a few points throughout this district and producers are hopeful that the gain may be the forerunner of a slow upturn in demand for iron. Inventories of customers are very small. Scores of plants have now completed their fourth quarter contracts and are expected to be back with replacement orders over the next few weeks. Shipments are showing a moderate gain over January.

Bars, Plates and Shapes

New business in hot rolled bars has been fluctuating from week to week, and consisting mostly of fill-in and jobbers' replacement orders. Plates required at Lima for six Canadian National locomotives are understood to have been divided between an Eastern and a Middle West mill. Shape awards are headed this week by 360 tons for the Fassett Street bridge, Toledo, placed with Wisconsin Bridge Co., Milwaukee, and 250 tons for the Linderme Tube Co. plant in Cleveland, placed with Pittsburgh - Des Moines Steel Co. Inquiries and awards over 100 tons apiece for reinforcing bars are practically non-existent in this territory.

Bolts, Nuts and Rivets

Bolt, nut and rivet producers will reaffirm their present prices for second quarter shipments, in line with the recent action by steel producers. For the month to date, February orders are slightly ahead of those received in January. Requirements of agricultural implement manufacturers have been the major factor in sustaining activity of bolt and nut makers in the absence of railroad sales and minimum orders from hardware jobbers. Sentiment among all classes of buyers is reported to have shown a marked improvement in the last few days.

Sheets and Strip

The past week has seen an increase in the number of single carload sheet orders, some of which had been held up until prices were announced. The announcement also brought the release of quantities of strip, already processed, held by mills at the request of customers. The reduction in pickling extras on 17 to 22 gage hot rolled sheets, inclusive, re-establishes the differential between that grade and cold rolled sheets which prevailed prior to Feb. 9, except for the oiling extra which was waived frequently. The $2 reduction in commodity cold rolled strip, a product used principally by the automobile industry, lowers the base on 14 gage to 3.35c, Pittsburgh or Cleveland, while 20 gage is 3.75c, Pittsburgh or Cleveland.

Tubular Goods

Casing and other oil country goods continue in fair demand with drilling operations holding up in the Southwest. While plans for two fair-sized oil lines are being expedited in the West, activity in the Great Lakes region is marking time, partly due to seasonal conditions. Seamless mechanical tubing, boiler tubes and standard pipe are quiet.

Warehouse Business

The movement from warehouses in this district continues erratic. February volume is lower than during the corresponding part of January, in the case of some distributers being off as much as 25 per cent. As there is very little demand for cold rolled sheets from warehouses here, the Feb. 9 reduction by mills has not yet been followed.

Wire and Wire Products

With buyers now assured that base prices will be unchanged on rods, wire and wire products for second quarter shipment, producers look for a certain amount of hesitant buying to be stimulated. One of the principal benefits hoped for by mills through the reaffirmation is stabilization of secondary markets. No changes have been made in any extras. A number of jobbers are known to have been holding back until announcement of second quarter prices before rounding out their stocks to meet the spring seasonal demand.

Iron Ore

Consumption of Lake Superior ore by furnaces in January totaled 1,923,056 tons, an increase over December of 6468 tons, according to the Lake Superior Iron Ore Association. Consumption during January, 1937, amounted to 4,694,312 tons. Ore on hand at furnaces Feb. 1 totaled 33,007,075 tons and ore on Lake Erie docks 5,874,757 tons, making the total Feb. 1 of 38,881,832 tons, compared with 26,747,006 tons Feb. 1, 1937. There were 70 furnaces in blast Feb. 1, a decrease of four from Jan. 1 and compared to 141 furnaces in blast Jan. 31, 1937.

....ST. LOUIS....

... *Public work principal activity in construction.*

ST. LOUIS, Feb. 22. — Central Engineering Co., Davenport, Iowa, is low bidder on the general contract for Dam No. 24 at Clarksville, Mo., involving 2924 tons of structural shapes, if welded, and 3092 tons, if riveted, with bids of $2,699,142 and $2,658,171 respectively. Other items required are 565 tons of reinforcing bars, 3000 tons of steel sheet piling, 195 tons of steel forgings and 185 tons of steel castings.

Bids will be opened Feb. 24 for construction of the Possum Kingdom Dam and Power House in Palo Pinto County, Tex., requiring 4500 tons of reinforcing bars and 1135 tons of structural shapes.

Lehr Construction Co., St. Joseph, Mo., has been awarded the contract for a State office building at Jefferson City, Mo., requiring 320 tons of reinforcing bars. McCarthy Brothers Construction Co., St. Louis, has been awarded the general contract for a power house at the Missouri State Prison at Jefferson City, requiring 250 tons of structural shapes and 100 tons of reinforcing bars. Woermann Construction Co., St. Louis, has been awarded the general contract for an addition to the bottling plant of Griesedieck Brothers Brewery Co., involving 190 tons of reinforcing bars. Olson Construction Co., Waterloo, Iowa, is general contractor for a highway bridge in Pike County, Ill., involving 260 tons of structural shapes.

Missouri Bridge & Iron Co., St. Louis, is low bidder on 185 tons of structurals for a highway bridge in Logan County, Ill., which company has been awarded 100 tons of structural for signal system platforms on the municipal bridge at St. Louis.

Reaffirmation of present prices for the second quarter of 1938, as made by Carnegie-Illinois Steel Corp. is announced by other steel mills, which they believe should remove the uncertainty which has been prevailing in the trade and cause the release of some pent-up tonnages. However, there have been no results of this kind so far. Extras for pickling 17 and 18 gage sheets and 19 to 22 gages have been reduced 5c. and 10c. per 100 lb., respectively.

Shipments of pig iron during February are expected to equal those of January, although the latter had three more days. However, very little new business is being placed. Operations in the stove plants are light, spring business being disappointing, but work is expected to start some time next month on summer and fall trade. Agricultural implement plant operations continue at about two-thirds capacity, which rate is expected to prevail during the remainder of the year. Gray iron castings orders are spotty, several foundries reporting an increase in business to justify a four-day week, while others are operating only two or three days a week.

Ingot operations are slightly down to 25.6 per cent of capacity.

....PIPE LINES....

Southern Pipe Line Corp., 411 North Broadway, Corpus Christi, Tex., recently organized as a joint interest of Phillips Petroleum Co., Bartlesville, Okla., and Southern Minerals Corp., Corpus Christi, plans new 6⅝-in. welded steel pipe line from Turkey Creek oil field, Nueces County, Tex., to terminal plant of last noted company at Corpus Christi, about 10 miles, for crude oil transmission.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Thomas, Ky., asks bids until March 4 for steel pipe (Proposal 906-25).

Bay Pipe Line Corp., 205 Bearinger Building, Saginaw, Mich., recently organized and now building a 6-in. welded steel pipe line from Buckeye Township oil field, Gladwin County, Mich., to Bay City, Mich., about 35 miles, for crude oil transmission, will install a steel pipe line gathering system in oil field noted, with pumping station for booster service and other operating facilities. James C. Graves is vice-president.

Robstown, Tex., will take bids soon for a steel pipe line system for municipal gas distribution. Cost about $75,000. Bond issue was authorized recently. Garrett Engineering Co., Houston, Tex., is consulting engineer.

City Water Commission, San Bernardino, Cal., has let contract to Southern Pipe & Casing Co., Azusa, Cal., for 4700 ft. of 12-in., i.d., 10-gage electric welded steel pipe for main water line.

Sunset, La., plans steel pipe lines for natural gas distribution in parts of St. Landry Parish.

Fred L. Dougherty & Sons, Dunkirk, N. Y., plan about 8000 ft. of 6½-in. steel pipe for development and pipe line system in Oriskany natural gas field near Wellsville, N. Y. Fred L. Dougherty is company head and engineer.

Glenn P. Morrison, Perrysville, Cattaraugus County, N. Y., plans steel pipe lines at Versailles, N. Y., for gas distribution, including main transmission line.

Commonwealth Pipe Line Co., Holland, Mich., has acquired pipe lines of Imperial Refining Co., Grand Rapids, Mich., in Allegan, Mich., oil field including steel pipe line gathering system, and will build additional welded steel pipe lines for connections with company system, for crude oil transmission. Commonwealth company also is considering new welded steel pipe line from oil field noted to a point near Holland or Muskegon, Mich.

...BOSTON...

... *Pig iron slightly more active; better business expected.*

BOSTON, Feb. 21.—The pig iron market was a little more active the past week, sales having exceeded 1000 tons for the first time this year. There is an inquiry for 300 tons and some for smaller lots. The pickup is not due to any noticeable increase in the melt, but to prospects of better business next month. A settlement of the railroad freight rate question is expected to stimulate trade.

Cast iron pipe is moving more freely, but most contracts are being placed without competition. The largest letting in the fabricated steel market the past week was 72 tons, and new prospects are scarce. However, there is a fair tonnage hanging over the market. New Hampshire will be in the market for several hundred tons of reinforcing steel, possibly late this week.

New England industries generally are quiet, but here and there companies, in no way associated with steel, are operating full five days per week for the first time since last October, and possibly may be a forerunner of more general activity.

..BIRMINGHAM..

... *Tennessee company puts two blast furnaces on.*

BIRMINGHAM, Feb. 21. — Two additional blast furnaces of the Tenn. Coal, Iron & Railroad Co. resumed production last week, Ensley No. 1 on Feb. 15 and Fairfield No. 5 on Feb. 17. This company is now operating seven of its eight furnaces. The district's total has been increased to 13, with the Tennessee company operating seven; Woodward Iron Co., three; Sloss-Sheffield Steel & Iron Co., two, and Republic Steel Corp., one.

Last week 12 open hearth units were in production. This week there will be 11, the reduction being at Fairfield. Four are scheduled for Fairfield, three for Ensley and four for Gadsden.

New steel and pig iron tonnage is limited. Lately there has been little fluctuation in weekly bookings of steel, with only a moderate inflow of new business. Pig iron demand and shipments are still restricted.

. . . . NEW YORK. . . .

. . . Spotty improvement, but nothing substantial, follows price clarification.

o o o

. . . Trade now looks forward to freight rate decision as a market help.

o o o

. . . Highway program in and around New York to cost $3,575,000.

NEW YORK, Feb. 21. — There has been no appreciable increase in new business in this district, except in a few spots, as a result of the announcements of prices for the second quarter. However, too little time had elapsed up to the time of going to press to form any conclusion as to the effect that price clarification may have on the attitude of buyers. Some orders have been released that are known to have been held back pending a solution of the wage and price question, but whether a substantial volume of business will come into the market within the near future is a question on which the steel companies themselves appear to have no accurate knowledge. One large company, however, has made a check of operating rates among some of its more important customers, the results indicating that many consumers are running well above the steel ingot production rate, some as high as 60 per cent of their capacity, suggesting that the long drawn out process of liquidating steel inventories is nearing the point where steel must again be bought.

Interest now centers in the freight rate increase expected to be announced within the next few weeks. Activity in Administration circles in Washington is being directed toward finding a solution for the ills of the railroads which a freight rate increase alone may not cure. A thorough-going reorganization of the railroad structure, with a permanent solution of the situation faced by the weaker roads, may be the outcome, in which case the railroad market for steel and other products would be greatly improved in time, although the effects might not be felt immediately.

A program for the development of arterial highways in the Metropolitan area that will require two years to complete at an estimated cost of $3,575,000 was announced recently by the Park Commission. Plans call for an extension of the Hutchinson River Parkway in the Bronx, extension of the Southern Parkway in Queens, construction of a Marine Parkway spur in Brooklyn and construction of bridges and viaducts on Cross County Parkway in Westchester. Bills to appropriate the funds required for the program are before the State Legislature.

Pig Iron

Several large producers have reaffirmed first quarter prices for second quarter business and it is expected that the rest of the producers will follow suit. While these announcements will do much toward clarifying the price situation, it is not expected that any heavy buying will develop immediately. The uncertainty surrounding Federal policies is still considered the chief obstacle to be overcome before normal purchasing can be expected. Sales over the past week showed no improvement over the low levels of the past two months and consumers still adhere to the policy of covering only immediate requirements. It is reported that a recent sale of Southern iron for export shipment was made at slightly less than $17, Mobile.

Reinforcing Bars

Jobber sales at present are limited to small pickup lots and are the lightest the trade has experienced in several years. The largest inquiry pending is the northerly unit of the Flushing River bridge, calling for 370 tons of bars. Bids on several small lots for WPA projects are being taken by the Treasury Department and will be opened on Feb. 23.

Plates and Sheets

Plate business still shows no sign of life as the principal sources of orders are still out of the market. The steel has yet to be awarded on the 3000-ton pipe line job in Brooklyn. One of the largest orders last week was upward of 300 tons of plates bought by Public Service Corp. of New Jersey for a tank.

Even before prices were reaffirmed on hot rolled products, sheet business had shown a pickup. One district office reported the largest sales volume last week thus far in 1938, most of the orders coming from manufacturers, including an order for 150 tons of cold rolled sheets. The same firm had done practically no business the week before, except in specialties. Jobber buying is absent, since stocks are still high. Jobbers are obviously relieved by the new price situation since they will not have to revalue their inventories.

On the third lot of galvanized sheets for the Panama Canal, Sheet Metal Mfg. Co., Youngstown, was low bidder with an overall price of $4,841.21 f.a.s. Cristobal, Panama Canal Zone, on the lot of seven items, running from 28 to 14 gage copper bearing galvanized flat steel sheets, totaling 96,000 lb. Mill bids averaged $5,143.60. State of Maine reopens bids on March 8 on 150 tons of 24-gage hot rolled pickeled annealed sheets for license plates. The original bids were thrown out.

New Engine Head for Ford V-8 Engines

DETROIT.—A new engine head for Ford V-8 engines has been announced by the Federal Mogul Corp., Detroit. The head is solid, with no water jacketing, and is cast from a special alloy containing considerable copper. It is claimed to have unusual heat dissipating qualities. When used with a copper gasket, it is said to be immune from breakage due to overheated motors. Compression ratio is 20 per cent higher than with standard heads.

. . PHILADELPHIA . .

. . . District operations hold at 29 per cent.

o o o

. . . Price stability improves buying sentiment.

o o o

. . . ICC rate decision expected this week.

PHILADELPHIA, Feb. 21. — Practically every sales office here reports that consumers are releasing more orders now that the second quarter price situation has been clarified. As was generally expected, light hot rolled sheets of the annealed and pickled variety have been re-priced by a reduction in extras in order to establish again an approximate $2 spread between the hot and cold rolled grades. Most consumers, however, had looked forward to much more widespread reductions, spreading into the bar, shapes and plate classifications, and were not a little disappointed with the firm price action. This disappointment has given away to a general realization that there probably will be no additional weakness throughout the quarter, and some tonnage which had been withheld is now getting onto mill books. But this better demand has not found its way to rolling schedules as yet, and for this reason is not reflected in an improvement in operating rate for the current week, and probably will not do so for several weeks to come. Operations in the eastern Pennsylvania area continue to average about 29 per cent of theoretical capacity.

It is generally believed here that the ICC rate decision will become public sometime late in the week, and probably will show an increase in the neighborhood of 10 per cent. Assuming such to be the case, the railroads will almost have to discard their present market indifference in order to fulfill in part the many promises they have made. Any such action of this nature would of course help mills here as this district depends primarily on support from the carriers.

Pig Iron

Reaffirmation of prices for second quarter has not influenced the market to any perceptible degree so far. Buying continues on a hand-to-mouth basis and will continue so for some time to come. Foundry melt will probably not show any significant improvement for some weeks yet, and until that time most shops are easily able to live for the most part on stocks already in their yards. About 7500 tons of Japanese business has been placed in this area, and deliveries are scheduled for completion within three months.

Sheets, Plates and Shapes

Automobile sheet releases have improved during the week, and are expected to increase steadily over the next several months. Tin plate, which has been very dull for the past quarter, has latterly shown a tendency to improve, in that releases are in better volume and are more widespread, indicating therefore that many consumer stocks are being liquidated. Plates are in a bad shape, with miscellaneous business almost nil, and large lots such as ship tonnages being held up because of overbidding on the part of shipbuilders. Shapes, also, have a rather poor outlook. There is practically no private work up for consideration here, and the Pennsylvania State Authority work, which for several months has been very active here, is scheduled for completion by the first of April. The only major award of the week, 470 tons, went to Keystone Structural Steel Co. for the Pennhurst, Pa., school. The Bala-Cynwyd school, involving 300 tons, is up for rebidding on March 7, and tenders go in late this week on 600 tons for a hospital at Danville, Pa., and 500 tons for hangars at Bolling Field. Reinforcing bars likewise are not very active. The week's only award involved 850 tons for a Washington art gallery which went to American Steel Engineering Co., and the only major active tonnage is 1400 tons for a local department store.

. . CAST IRON PIPE . .

Haverhill, Mass., has taken under advisement bids for 9000 ft. of 8-in. pipe, and United States Treasury Department 6950 ft. of 6-in. for the same job.

Greenwich Water Co., Greenwich, Conn., plans extensions and replacements in pipe lines for water system; also installation of new fire hydrants and other facilities. Cost close to $100,000.

Colorado Springs, Colo., will ask bids soon for about 14,000 ft. of 30-in. for new main water line from Bell Crossing to high line reservoir. Cost about $100,000.

Chesapeake Bay., Md., will take bids soon for pipe lines for water system, including new main line; also for a steel standpipe. Fund of $60,000 has been arranged for this and other waterworks installation. J. B. McCrary Co., Atlanta, Ga., is consulting engineer.

Church Point, La., asks bids until March 11 for pipe lines for water system and other waterworks installation.

Germantown, N. Y., plans pipe lines for water system and other waterworks installation. Cost about $50,000.

Grafton, Iowa, closes bids March 1 for 9430 ft. of 2, 4 and 6-in. for water system; also for 4056 lb. of special fittings, 25,000-gal. elevated steel tank on 100-ft. steel tower, valves and other waterworks equipment. Ralph W. Gearhart, 349 Twenty-first Street, S.E., Cedar Rapids, Iowa, is consulting engineer.

Merrill, Wis., plans extensions in water pipe lines; also other waterworks equipment. Financing is being arranged through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

West Unity, Ohio, has awarded 300 tons of 4, 6 and 8-in. cast iron water pipe to J. B. Clow & Sons, Cleveland, for a new distribution system.

Beulah, Colo., is arranging special election to vote bonds for $30,000 for pipe lines for water system and other waterworks installation.

Seneca Falls, N. Y., plans extensions in water pipe lines; also new trunk line for main supply, about seven miles in all. A new pumping station will be built. Cost about $175,000. Nicholas Hill, Jr., Nicholas S. Hill Associates, Inc., 112 East Nineteenth Street, New York, are consulting engineers.

Sadieville, Ky., has plans for pipe lines for water system and other waterworks installation. Cost about $34,000, part of fund to be secured through Federal aid.

Elwood, Kan., has approved bond issue of $26,000 for pipe lines for water system and other waterworks installation, including steel standpipe. Cost about $46,000, remainder of fund to be secured through Federal aid. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., and Farmers' Union Building, Salina, Kan., are consulting engineers.

Bunkerville-Mesquite Water District, Las Vegas, N. M., plans about 15,000 ft. of 2½-in. for water system. Financing being arranged through Federal aid.

Long Beach, Cal., has awarded 1900 tons of 4 to 20-in. to United States Pipe & Foundry Co., San Francisco.

Seattle Water District No. 3 has postponed bids on 320 tons of 4 and 6-in. pipe and fittings until March 4. W. H. Harris, 1164 Empire Building, Seattle, is secretary of district.

Seattle Harrison Street pipe line (Magnolia-Queen Anne-Volunteer Park) will require about 1000 tons of 12 to 20-in. cast iron pipe as well 24 and 36-in. steel pipe reported last week. Bids have been opened.

Seattle Lowell Water District has opened bids on 376 tons of 4, 6 and 8-in. pipe and fittings.

East Bay Municipal Utility District, Oakland, Cal., has opened bids on 863 tons 4, 6, 8 and 12-in. pipe.

Los Angeles Department of Water and Power has opened bids on 782 tons of 6 and 8-in. pipe.

PERSONALS

(CONTINUED FROM PAGE 81)

gineering in June, 1922, he started work in August of that year with the Central Steel Co., Massillon, Ohio, in the metallurgical laboratory and later worked in the operating department. He continued with the company after its merger with the Central Alloy Steel Co., and later with Republic Steel Corp. Mr. Sergeson is a member of the American Society for Metals and was chairman of the Canton-Massillon chapter in 1932.

❖ ❖ ❖

FRANCIS D. BOWMAN, advertising manager, the Carborundum Co., Niagara Falls, N. Y., addressed the Cleveland Engineering Society at its meeting, Feb. 10, outlining the manufacture and applications of Carborundum and Aloxide. He showed a recently completed motion picture.

❖ ❖ ❖

CLIFFORD F. HOOD, president, American Steel & Wire Co., Cleveland, outlined the recent progress of the steel industry and the role of research and development laboratories, at a meeting Feb. 17 of the Cleveland Purchasing Agents' Association. F. J. MEKET, Aluminum Co. of America, association president, welcomed a number of industrial executives who were guests. ARTHUR G. HOPCRAFT, Cleveland Worm & Gear Co., was toastmaster.

❖ ❖ ❖

W. F. PARKER, president, Standard Transformer Co., Warren, Ohio, has been elected to the board of governors, National Electrical Manufacturers' Association.

❖ ❖ ❖

H. J. HOFFMAN has been appointed manager, Westinghouse Electric & Mfg. Co.'s new special products div. at Bloomfield, N. J. This new division covers reorganization of the company's manufacturing facilities, embracing the design, manufacture and sale of electronic tubes.

❖ ❖ ❖

TAYLOR H. BEECH has been appointed Pittsburgh sales representative of Darwin & Milner, Inc., Cleveland, with offices at 1031 Glenn Street, Wilkinsburg, Pa.

❖ ❖ ❖

NORTON T. JONES has been elected executive vice-president of the Van Dorn Iron Works Co., Cleveland.

❖ ❖ ❖

JAMES A. FARRELL, retired president of the United States Steel Corp., New York, received the gold medal of the American-Irish Historical Society on Feb. 19 at the annual dinner of the society in New York. The medal is awarded annually to "the American citizen of Irish blood whose work is judged outstanding in his field."

❖ ❖ ❖

C. O. DRAYTON, formerly general sales manager of the Graton & Knight Co., Worcester, Mass., has been appointed general sales manager of the American Screw Co., Providence. He will be responsible for the complete coordination of all sales activities, working with WILLIAM F. HENNING, domestic sales manager and HARRY MAYOH, sales promotion manager. Mr. Drayton has taken an active interest in association work and is a member of the National Federation of Sales Executives, member of the executive committee of the American Supply and Machinery Manufacturers' Association, member of the Marketing Executives Society and on the board of councillors of the American Management Association.

❖ ❖ ❖

G. J. HAWKEY, of the Cleveland Duplex Machinery Co., Inc., Cleveland, has been appointed to handle the sale of all products of the Audubon Wire Cloth Corp., Philadelphia, in the Cleveland district.

❖ ❖ ❖

T. R. LICHTENWALTER, welding engineer for the Alloy steel division of Republic Steel Corp., Cleveland, is to address the New York section of the American Welding Society at its March 1 meeting at the Polytechnic Institute, Brooklyn. His talk will be entitled "The Welding of the High Chromium and Chromium-Nickel Stainless Type Alloys."

❖ ❖ ❖

GEORGE H. REAMA has been named factory manager for the American Screw Co., Providence. He was with the Winchester Repeating Arms Co. from 1911 until 1920, when he was appointed assistant mechanical superintendent of the Corbin Screw Corp. He returned to Winchester in 1923 and remained there until 1934.

❖ ❖ ❖

JOHN A. COAKLEY, former general traffice manager, Carnegie - Illinois Steel Corp., Pittsburgh, has been elected president of Automatic Sprinkler Corp. of America, Youngstown.

U. S. Steel Corp. to Clear Way for Future Financing

UNITED STATES STEEL CORP. this past week asked its common and preferred stockholders to clear the way for whatever financing the corporation's management from time to time adopts.

In one of his last official acts Myron C. Taylor, who retires April 1 as the corporation's chairman, requested that common and preferred stockholders at their April 4 meeting approve the following steps:

1. To change each share of authorized common stock of the corporation with par value ($100) into one share of common stock without par value; to decrease the capital of the corporation by reducing to $75 the capital represented by each share of the issued and outstanding common stock as so changed; and to increase the authorized common stock as so changed from 12,500,000 shares to 15,000,000 shares.

2. Without impairing any of the charter restrictions as to the issuance of secured obligations, to confer on the board of directors authority to issue, at such times and for such consideration as the board of directors may determine, bonds, debentures and other obligations of the corporation convertible into common stock of the corporation.

Under its present certificate of incorporation United States Steel cannot authorize and sell common stock for less than $100 a share or issue and sell bonds, debentures or other obligations convertible into common stock.

However, the proposed changes, making the corporation's capital structure more flexible, will give common stockholders pro rata subscription rights for any stock or obligations convertible into stock, will increase the capital surplus of the corporation by $217,581,300 to $298,831,321, and will reduce the item of intangible assets in the corporation's balance sheet to a nominal value of $1 by charging the amount of $260,368,520 against the capital surplus, thus leaving a capital surplus of $38,462,800.

In the five years ended Dec. 31, 1937, United States Steel spent $250,000,000 for rehabilitation and new construction, of which $225,000,000 was provided without the issue or sale of securities, Mr. Taylor said in his letter urging shareholders to approve the proposed revisions.

IRON AND STEEL SCRAP

. . . Small sale of No. 1 steel at Chicago at $12, off 50c.

o o o

. . . Composite declines 16c. to $13.67.

FEB. 21.—Activity in most markets remains practically at a standstill, making prices nominally unchanged. On the strength of a minor tonnage sale of No. 1 steel at Chicago, however, at $12 a ton, 50c. below previous quotations, prices on nearly every other item have been marked off a like amount. As a result, the composite price is down 16c. from last week to a low for the year of $13.67. This change brings the average back to the level prevailing at the end of December. St. Louis dealers have cut buying prices 50c. in the hope of getting mill business at the new level, but consumer sales have yet to be seen. Detroit prices are also off. Chief activity is still at Buffalo, where the principal consumer has taken in 20,000 tons of new material under a price averaging plan with material on old order. The new price for No. 1 remains at $13, as in the recent past.

The last European cartel order is reaching the cleanup stage and no new orders are in sight until midsummer, provided the international situation does not become more complex. Japanese inquiries are higher than they have been and orders are in thousands of tons instead of hundreds as in the past month.

Downward readjustment in the prices of turnings and borings is indicated by scrap purchases of recent date. A sale of 300 tons to a mill recently and the purchase of more than 1000 tons from one producer helped to set the pace at the lower figure. Sale of No. 2 heavy melting steel at $8.75 a ton on track to an out-of-town mill also indicated necessity for readjustment in the heavier grades. The Fisher list which closed a week ago gave indications of a weakness on bundles. Lists for all the automotive plants are coming out this week, bringing with them estimates of higher production of scrap accompanying improved rate of automobile production.

Pittsburgh

Current scrap prices are purely nominal due to absence of consumer buying. Most transactions occurring between brokers and dealers involve small tonnages. Activity is at the lowest point at any time during the past several years. However, with No. 1 steel not too plentiful and with the export influence still being felt to some extent, there is not much chance of a sharp decline in present quotations. In fact, a substantial purchase would probably cause the markets to move upward.

Chicago

The sale of an unimportant tonnage of No. 1 heavy melting steel at $12 was reported this week, on the basis of which, together with continued weakening of general sentiment in the trade, No. 1 is quoted 50c. less at $12 to $12.50, with proportionate reductions throughout most of the list. Mill operations, though steady, still are not so high as to warrant much interest on their part in the market, and quiet prevails.

Cleveland

In the absence of any extensive buying either by dealers or mills, quotations on scrap are unchanged this week at Cleveland and Youngstown with No. 1 heavy melting steel remaining at $12 to $12.50 per ton in the former district and $13 to $13.50 per ton in the Valley. Weaknesses in other districts have not been reflected here to any great extent. Dealers look for another period of quiet during the next two weeks, especially since the monthly railroad lists will soon be coming out.

Buffalo

The largest area consumer continues to receive material under its price averaging arrangement with a total of 20,000 tons taken in under this plan. This tonnage embraces various open-hearth grades with a small percentage of the whole No. 1 heavy melting steel at $13. This consumer also is buying machine shop turnings at $7, but does not permit this material to be shipped as part of the price averaging arrangement, lest it receive too much. Odd cars of cupola cast scrap at $14 to $14.50 are reported sold, but this is the only new buying apparent.

New York

There have been no sales into domestic consumption for almost two months and prices for materials on cars remain purely nominal and largely keyed to consumer prices in eastern Pennsylvania. Export activity is undergoing a phase change and buying prices remain as they have been for over three months. With tension increasing in Europe, a shadow is cast across further cartel transactions, aside from the fact that latest advices from that group indicated that it would be mid-summer before new purchases would be made. Meanwhile, Japanese inquiry is more active than it has been in months, and orders, though still in relatively small tonnages compared with past activity and with European cartel purchases, are much more substantial than they have been. Heavy buying is looked for in March, if credit restrictions do not interfere.

Boston

One boat will finish loading for Germany this week, and five others are scheduled to arrive for full or part cargoes. Providence exporters expect a boat late this week. This sudden burst of export activity by certain trade interests is taken as the beginning of the winding up of shipments for a time at least. Exporters generally have plenty of No. 2 steel, but some are short of No. 1 and therefore limiting contracting to such material. Export prices are firm and unchanged. New England foundries continue to take machinery cast in a small way, and chemical borings are going to gas purifiers, but the domestic scrap market otherwise is virtually at a standstill.

St. Louis

Dealers cut their buying price 50c. a ton on No. 1 heavy melting steel, a district mill having indicated it would buy 1000 tons of that item if a reduction of that amount was made. If the material can be had at the lower price, the sale will be made. No. 1 heavy melting, miscellaneous standard section rails, and No. 2 railroad wrought also were reduced 50c. a ton.

Cincinnati

Old materials are without active trading. A few small orders for cast iron grades are reported, but these have only small market influence. Dealers, carrying fair yard supplies, are reluctant to make any further speculative purchases so that trading is relatively nil.

Philadelphia

Export sentiment is under some pressure, the result being that No. 1 is quotably down 50c. to $14 to $14.50, delivered Port Richmond. The No. 2 grade, being considerably more plentiful, is even weaker, being now in the neighborhood of $13 to $13.50, Port Richmond. For domestic delivery, No. 2 rates about the same price level as for export, but No. 1 is holding firmly at $14.50 to $15 on the basis of sporadic purchases to fill orders at several district points. Although one large Japanese house insists that scrap commitments are being held up until exchange permits are released, there is evidence that independent units are entering orders for delivery to the Orient. How much of this tonnage, if any, will leave from this area is still in doubt, although it is likely that export will continue to be a market factor here for some time to come.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton to delivered to consumer:

No. 1 hvy. mltng. steel	$13.75 to $14.25
Railroad hvy. mltng...	15.50 to 16.00
No. 2 hvy. mltng. steel	12.75 to 13.25
Scrap rails	15.50 to 16.00
Rails 3 ft. and under..	18.00 to 18.50
Comp. sheet steel.....	13.75 to 14.25
Hand bundled sheets..	12.75 to 13.25
Hvy. steel axle turn..	12.25 to 12.75
Machine shop turn....	8.00 to 8.50
Short shov. turn.....	8.00 to 8.50
Mixed bor. & turn.....	6.75 to 7.25
Cast iron borings	6.75 to 7.25
Cast iron carwheels..	15.00 to 15.50
Hvy. breakable cast...	12.50 to 13.00
No. 1 cupola cast.....	16.00 to 16.50
RR. knuckles & cplrs..	17.50 to 18.00
Rail coil & leaf springs	17.50 to 18.00
Rolled steel wheels....	17.50 to 18.00
Low phos. billet crops.	18.00 to 18.50
Low phos. sh. bar.....	17.50 to 18.00
Low phos. punchings..	17.00 to 17.50
Low phos. plate, hvy..	17.00 to 18.00
Low phos. plate clips..	15.00 to 15.50
Steel car axles	17.50 to 18.00

PHILADELPHIA

Per gross ton to delivered to consumer:

No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel.	13.00 to 13.50
Hydraulic bund., new.	14.50 to 15.00
Hydraulic bund., old..	10.00 to 10.50
Steel rails for rolling..	16.00 to 16.50
Cast iron carwheels...	15.50 to 16.00
Hvy. breakable cast...	14.50 to 15.00
No. 1 cast	15.50 to 16.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turn....	6.50 to 7.00
No. 1 blast furnace....	6.00 to 6.50
Cast borings	6.00 to 6.50
Heavy axle turnings...	10.50 to 11.00
No. 1 low phos. hvy...	17.00 to 17.50
Couplers & knuckles..	17.00 to 17.50
Rolled steel wheels....	17.00 to 17.50
Steel axles	19.00 to 19.50
Shafting	19.00 to 19.50
No. 1 RR. wrought....	15.00 to 15.50
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire.....	11.00 to 11.50
Cast borings (chem.)..	12.50 to 13.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$12.00 to $12.50
Auto. hvy. mltng. steel alloy free	10.50 to 11.00
No. 2 auto. steel	10.00 to 10.50
Shoveling steel	12.00 to 12.50
Hydraul. comp. sheets.	11.00 to 11.50
Drop forge flashings...	9.75 to 10.25
No. 1 busheling	10.75 to 11.25
No. 2 busheling, old...	5.25 to 5.75
Rolled carwheels	14.50 to 15.00
Railroad tires, cut....	16.00 to 17.00
Railroad leaf springs.	15.50 to 16.00
Steel coup. & knuckles	14.50 to 15.00
Axle turnings	11.50 to 12.00
Coil springs	16.50 to 17.00
Axle turn. (elec.).....	11.50 to 12.00
Low phos. punchings..	15.50 to 16.00
Low phos. plates, 12 in. and under	14.50 to 15.00
Cast iron borings	6.00 to 6.50
Short shov. turnings...	8.00 to 8.50
Machine shop turn....	5.50 to 6.00
Rerolling rails	15.25 to 15.75
Steel rails under 3 ft...	15.50 to 16.00
Steel rails under 2 ft...	16.00 to 16.50
Angle bars, steel.....	14.50 to 15.00
Cast iron carwheels...	13.75 to 14.25
Railroad malleable ...	13.75 to 14.25
Agric. malleable	12.00 to 12.50
	Per Net Ton
Iron car axles	$18.00 to $18.50
Steel car axles	17.00 to 17.50
No. 1 RR. wrought....	9.50 to 10.00
No. 2 RR. wrought	10.75 to 11.25
Locomotive tires	15.75 to 16.25
Pipes and flues	9.25 to 9.75
No. 1 machinery cast..	11.50 to 12.00
Clean auto. cast.....	11.25 to 11.75
No. 1 railroad cast....	10.75 to 11.25
No. 1 agric. cast.....	10.50 to 11.00
Stove plate	8.50 to 9.00
Grate bars	8.50 to 9.00
Brake shoes	8.00 to 8.50

YOUNGSTOWN

Per gross ton to delivered to consumer:

No. 1 hvy. mltng. steel.	$13.00 to $13.50
Hydraulic bundles	12.50 to 13.00
Machine shop turn.....	9.50 to 10.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$12.00 to $12.50
No. 2 hvy. mltng. steel.	11.00 to 11.50
Comp. sheet steel	11.50 to 12.00
Light bund. stampings.	8.50 to 9.00
Drop forge flashings...	11.00 to 11.50
Machine shop turn. ...	7.50 to 8.00
Short shov. turn.....	8.50 to 9.00
No. 1 busheling	11.00 to 11.50
Steel axle turnings ...	10.00 to 10.50
Low phos. billet and bloom crops	18.00 to 18.50
Cast iron borings	8.00 to 8.50
Mixed bor. & turn.....	8.00 to 8.50
No. 2 busheling	8.00 to 8.50
No. 1 cast	16.00 to 16.50
Railroad grate bars ..	8.00 to 8.50
Stove plate	8.00 to 8.50
Rails under 3 ft.	17.50 to 18.00
Rails for rolling	16.00 to 16.50
Railroad malleable	16.00 to 16.50
Cast iron carwheels...	15.00 to 15.50

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	$12.50 to $13.00
No. 2 hvy. mltng. steel.	10.50 to 11.00
Scrap rails	12.50 to 13.00
New hvy. b'ndled sheets	11.00 to 11.50
Old hydraul. bundles..	10.00 to 11.00
Drop forge flashings..	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Hvy. axle turnings....	11.00 to 11.50
Machine shop turn....	6.50 to 7.00
Knuckles & couplers..	16.00 to 16.50
Coil & leaf springs....	16.00 to 16.50
Rolled steel wheels....	16.00 to 16.50
Low phos. billet crops.	17.00 to 17.50
Shov. turnings	8.00 to 8.50
Mixed bor. & turn.....	7.00 to 7.50
Cast iron borings.....	7.00 to 7.50
Steel car axles	16.00 to 16.50
No. 1 machinery cast..	15.00 to 15.50
No. 1 cupola cast.....	13.50 to 14.00
Stove plate	11.50 to 12.00
Steel rails under 3 ft...	17.50 to 18.00
Cast iron carwheels...	14.50 to 15.00
Railroad malleable ...	14.50 to 15.00
Chemical borings	10.00 to 10.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$12.00 to $12.50
No. 1 hvy. melting....	12.00 to 12.50
No. 2 hvy. melting....	11.00 to 11.50
No. 1 locomotive tires.	16.00 to 16.50
Misc. stand. sec. rails.	13.00 to 13.50
Railroad springs	15.50 to 16.00
Bundled sheets	10.00 to 10.50
No. 1 busheling	7.00 to 7.50
Cast bor. & turn.....	5.50 to 6.00
Rails for rolling	14.00 to 14.50
Machine shop turn....	5.00 to 5.50
Heavy turnings	8.50 to 9.00
Steel car axles	19.50 to 20.00
Iron car axles	21.50 to 22.00
No. 1 RR. wrought....	8.00 to 8.50
No. 2 RR. wrought....	12.00 to 12.50
Steel rails under 3 ft..	14.50 to 15.00
Steel angle bars	13.50 to 14.00
Cast iron carwheels...	13.50 to 14.00
No. 1 machinery cast..	12.00 to 12.50
Railroad malleable	13.00 to 13.50
No. 1 railroad cast....	11.50 to 12.00
Stove plate	9.00 to 9.50
Agricul. malleable	10.00 to 10.50
Grate bars	9.50 to 10.00
Brake shoes	9.00 to 9.50

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$9.50 to $10.00
No. 2 hvy. mltng. steel.	7.50 to 8.00
Scrap rails for mltng.	14.50 to 15.00
Loose sheet clippings.	6.00 to 6.50
Hydrau. b'ndled sheets	9.50 to 10.00
Cast iron borings.....	3.50 to 4.00
Machine shop turn....	4.00 to 4.50
No. 1 busheling	8.00 to 8.50
No. 2 busheling	3.00 to 3.50
Rails for rolling.....	16.50 to 17.00
No. 1 locomotive tires.	13.00 to 13.50
Short rails	17.00 to 17.50
Cast iron carwheels...	11.50 to 12.00
No. 1 machinery cast.	11.00 to 11.50
No. 1 railroad cast....	9.00 to 9.50
Burnt cast.	5.50 to 6.00
Stove plate	5.50 to 6.00
Agricul. malleable	10.50 to 11.00
Railroad malleable ...	12.50 to 13.00
Mixed hvy. cast.	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel....	$11.50 to $12.00
Scrap steel rails	14.00 to 14.50
Short shov. turnings..	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought....	.... 10.00
Rails for rolling	15.00 to 16.00
No. 1 cast	14.00 to 16.50
Tramcar wheels	14.00 to 15.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$9.25 to $10.25
No. 2 hvy. mltng. steel.	7.75 to 8.25
Borings and turnings..	5.50 to 6.00
Long turnings	5.25 to 5.75
Short shov. turnings...	6.25 to 6.75
No. 1 machinery cast.	11.75 to 12.25
Automotive cast	12.75 to 13.25
Hvy. breakable cast...	10.25 to 10.75
Hydraul. comp. sheets.	10.50 to 11.00
Stove plate	7.50 to 8.00
New factory bushel....	9.00 to 9.50
Old No. 2 busheling...	5.00 to 5.50
No. 2 busheling (black fender stock)	Nominal
Sheet clippings	7.25 to 7.75
Flashings	8.50 to 9.00
Low phos. plate scrap.	10.00 to 10.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$11.00 to $11.50
No. 2 hvy. mltng. steel.	9.50 to 10.00
Hvy. breakable cast...	10.50 to 11.00
No. 1 machinery cast.	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.00 to 9.50
Steel car axles	20.00 to 20.50
Shafting	16.00 to 16.50
No. 1 RR. wrought....	11.50 to 12.00
No. 1 wrought long...	10.00 to 10.50
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling.....	16.00 to 16.50
Clean steel turnings*..	5.00 to 5.50
Cast borings*	5.00 to 5.50
No. 1 blast furnace....	5.00 to 5.50
Cast borings (chem.)..	9.50 to 10.00
Unprepared yard scrap	7.50 to 8.00
Light iron	4.00 to 4.50
Per gross ton, delivered local foundries:	
No. 1 machn. cast.....	$15.50 to $16.00
No. 2 cast	13.00 to 13.50

*$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$13.30 to $13.80
Scrap rails	13.30 to 13.80
No. 2 steel	12.30 to 12.80
Breakable cast	.... 9.75
Machine shop turn.....	.... 2.60
Mixed bor. & turn.....	.... 2.60
Bun. skeleton long....	6.50 to 6.75
Shafting	17.00 to 17.50
Cast bor. chemical....	6.00 to 6.50
Per gross ton delivered consumers' yards:	
Textile cast	15.00 to 15.50
No. 1 machine cast....	15.00 to 15.50

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$11.65 to $12.15
No. 2 hvy. mltng. steel.	10.65 to 11.15

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$10.50	$9.50
No. 2 hvy. mltng. steel.	9.50	8.50
Mixed dealers steel....	8.50	7.50
Scrap pipe	8.50	7.50
Steel turnings	7.50	7.00
Cast borings	8.50	7.50
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	11.00	10.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges

No. 1 hvy. mltng. steel.	$13.50
No. 2 hvy. mltng. steel.	12.00
No. 2 cast	11.00
Stove plate ..... 8.50 to	9.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.....	$14.00
No. 2 hvy. mltng. steel.....	13.00
Rails (scrap)	14.00

Philadelphia, delivered alongside boats, Port Richmond

No. 1 hvy. mltng. steel.	$14.00 to $14.50
No. 2 hvy. mltng. steel.	13.00 to 13.50

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.75c.
Del'd New York	2.79c.
F.o.b. Birmingham	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars Pacific ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.45c.
F.o.b. Buffalo, Cleveland Youngstown, Chicago, Gary or Birmingham	2.50c
Del'd Detroit	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.30c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.35c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.445c.
F.o.b. Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.44c.
Del'd New York	2.54c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.445c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.465c.
Del'd New York	2.5125c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.70c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10, wrought iron, P'gh	4.25c.

Hot Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.45c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold Rolled

No. 10 gage, f.o.b. Pittsburgh	3.00c.
No. 10 gage, f.o.b. Gary	3.10c.
No. 10 gage, f.o.b. Detroit	3.20c.
No. 10 gage, del'd Philadelphia	3.30c.
No. 10, f.o.b. Granite City	3.20c.
No. 10 gage, f.o.b. Birmingham	3.15c.
No. 10 gage, f.o.b. cars, dock Pacific ports	3.525c.

Light Cold Rolled

No. 20 gage, f.o.b. Pittsburgh	3.45c.
No. 20 gage, f.o.b. Gary	3.55c.
No. 20 gage, del'd Detroit	3.65c.
No. 20 gage, del'd Philadelphia	3.75c.
No. 20 f.o.b. Granite City	3.65c.
No. 20 gage, f.o.b. Birmingham	3.60c.
No. 20 gage, f.o.b. cars, dock Pacific ports	3.925c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.10c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.
Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	$4.65
F.o.b. Gary	4.75
F.o.b. Granite City	4.85

Roofing Terne Plate
(*F.o.b. Pittsburgh*)
(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-rolled Hoops, Bands, Strip and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.40c.
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.49c.
F.o.b. Worcester	3.40c.

*Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Commodity Cold Rolled Strip

No. 14, Pittsb'gh or Cleveland	3.35c.
No. 14, Worcester	3.75c.
No. 20, Pittsb'gh or Cleveland	3.75c.
No. 20, Worcester	4.15c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smooth coated nails	2.75
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$3.15
Galvanized fence wire	3.55
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column.	75
Single loop bale ties, base col...	63

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	52	31	¼ & ⅜	+13	+35
¼ to ⅜	55	38½	½	20	1½
½	59½	49	¾	26	8
¾	62½	53	1 & 1¼	30	14
1 to 3	64½	55½	1½	34	16½
			2	33½	16

Lap Weld

2	57	47½	2	26½	10
2½ & 3	60	50½	2½ to 3½	27½	12½
3½ to 6	62	52½	4	29½	16
7 & 8	61	50½	4½ to 8	28½	15
9 & 10	60½	50	9 to 12	24½	10
11 & 12	59½	49			

Butt Weld, extra strong, plain ends

⅛	50½	36½	¼ & ⅜	+14	+48
¼ to ⅜	52½	40½	½	21	4
½	57½	48½	¾	27	10
¾	61½	52½	1 to 2	34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	29½	13½
2½ & 3	59	50½	2½ to 4	35	20½
3½ to 6	62½	54	4½ to 6	33½	19
7 & 8	61½	51	7 & 8	34½	19½
9 & 10	60½	50	9 to 12	28	15½
11 & 12	59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2½ in. o.d.	12 B.W.G.	19.37	17.21
2¾ in. o.d.	12 B.W.G.	21.22	18.85
2¾ in. o.d.	12 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

40,000 lb. or ft. or over					Base
30,000 lb. or ft.	to	39,999	lb. or ft.		5%
20,000 lb. or ft.	to	29,999	lb. or ft.		10%
10,000 lb. or ft.	to	19,999	lb. or ft.		20%
5,000 lb. or ft.	to	9,999	lb. or ft.		30%
2,000 lb. or ft.	to	4,999	lb. or ft.		45%
Under 2,000 lb. or ft.					65%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham.	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	56.00
F.o.b. dock, Seattle	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c and t nuts, square or hex. blank or tapped:	
½ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
½ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.60
F.o.b. Chicago or Birmingham	3.70

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more.)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
200 (½% Nickel)	$0.35
2100 (1½% Nnickel)	0.75
2300 (3½% Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickelichromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	22s. 6d. to 23s.
Steel bars, open hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£14
Galvanized sheets, No. 24 gage	£16 15s.

CONTINENTAL

Per Gross Ton, Go'd £.
f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£6 17s.
Plate 3/16 in. and 5 mm.	£6 13s.
Sheet, ⅛ in.	£7 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 15s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	2.45c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large . . . .1 to 24 kegs	$3.65
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bots, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	$3.30
Wire, galv. soft, base per 100 lb.	$3.70
Common wire nails, per keg	$2.90
Cement coated nails, per keg	$2.90

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bolts (keg lots)	5.05
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05
	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.25 to 7.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled: strip, soft and quarter hard	3.92c.
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.75c.
Galvanized sheets (No. 24*)	5.25c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.50c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.20c.
Deep drawing	5.85c.
Stretcher leveled	5.85c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.55c.
Floor plate, ¼ in. and heavier	5.60c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Tire steel, 1 x ½ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* For 1500 lb. or more; add 0.25c. on smaller lots. No. 28 and lighter, 36 in. wide, 20c. per 100 lb. higher.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	5.29c.
Boiler rivets	5.39c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	50
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, nuts; all quantities	60

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.90c.
*Structural shapes	3.90c.
*Soft steel bars, small shapes, iron bars (except bands)	4.00c.
‡Reinforc. steel bars, square and deformed	3.53c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	4.10c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	4.00c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.86c.
Soft steel bars	3.75c.
†Reinforc. steel bars	2.50c.
‡Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and carriage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	.55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg:	
Any quantity less than carload	3.20
Cement c't'd nails, base 100-lb. keg.	3.50
Chain. lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes,	
2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes.	
2-in.	20-73
4-in.	48.41

BUFFALO

	Base per Lb.
Plates	3.92c.
Floor plates	5.52c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.00c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.35c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

	Base per Lb.
Channels, angles	4.20c.
Tees and zees, under 3 in.	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.94c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.55c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)**	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

*Under 400 lb., .50c. over base, 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c.; 3500 lb. and over, base less .15c.

**In Detroit only, 1500 to 3749 lb., base less 0.25c.; 3750 to 7499 lb., base less 0.40c.; 7500 lb. and over, base less 0.60c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	3.85c.
Com. wire nails and cement coated nails 100 to 4999 lb.	3.30c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60–5
1⅛ in. and larger	60
Coach and lag screws	60–5
Hot-pressed nuts, sq. and hex. tapped or blank, 1–199 lb.	50
200 lb. and over:	
½ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50-10

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.85c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BIRMINGHAM

Bars and bar shapes	$3.85 base	
Structural shapes and plates	3.75	"
Hot rolled sheets No. 10 ga.	3.80	"
Hot rolled sheets No. 24 ga.	4.40	" 3500 lb. and over
Galvanized sheets No. 24 ga.	5.05	" 3500 lb. or more
Strip	4.05	"
Reinforcing bars	3.85	"
Floor plates	5.96	"
Cold finished bars	4.91	"

Machine and carriage bolts .....50 & 10 off list

Rivets (structural) $4.60 base

On plates, shapes, bars, hot rolled strip, heavy hot rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Reinforcing shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.66c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	2.975c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.25c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.45c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carolad	$3.40	$3.20	$3.40

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.47
Delivered Newark or Jersey City	26.53
Delivered Philadelphia	25.84
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.27
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered, San Francisco, Los Angeles or Seattle	26.75
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.61
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.53
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.61
Delivered Canton, Ohio	25.89
Delivered Mansfield, Ohio	26.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.24

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $102.50

Spiegelcisen

Per Gross Ton Furnace

Domestic 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50% $33.50

For each additional 0.50% silicon up to 17%, 50c. per ton is added.

Manganese 2 to 3%, $1 per ton additional. For each unit of manganese over 3%, $1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$101.50*
2.50% carbon	106.50*
2% carbon	111.50*
1% carbon	121.50*

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$2.00
Ferrotungsten, lots of 500 lbs., nominally	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher. †Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron Nominally 17 to 18c.	
Iron, basic or foundry, Swedish, aver. 65% iron. Nominally 16c.	
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	50c.
Man., African, Indian, 44-48%	45c.
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$23.50 to $25.00
Tungsten, domestic, scheelite delivered	$20.00 to $25.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	$16.00
Rhodesian, 45%	22.00
Rhodesian, 48%	25.50
Turkish, 48-49%	25.00 to $26.00
Turkish, 45-46%	23.00 to 23.50
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50%	$25.50 to $26.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$18.00 to $19.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	20.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.875c.
Del'd Cleve'd, No. 4 industrial	5.75c.
Del'd Cleve'd, No. 5 industrial	4.00c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$4.00 to $4.25
Furnace, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	11.05
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

. . .NON-FERROUS. . .

. . . Better sentiment evident in domestic markets.

o o o

. . . Copper export prices rise to 10.05c. per lb.

o o o

. . . Tin quotas cut from 70 to 55 per cent.

NEW YORK, Feb. 21.—Sentiment in the domestic non-ferrous markets showed noticeable improvement during the past week, and buyers were reported to be taking an active interest in the market for the first time in many weeks. The President's comments on commodity prices had little effect on the market outside of inspiring some bullishness on the part of speculators. Domestic copper sales last week averaged about 800 tons per day at an unchanged price of 10c. per lb., Connecticut Valley, for electrolytic metal. In Europe, rumors of impending inflation here encouraged active export demands all week and prices rose as high as 10.05c. per lb., c.i.f., usual base ports, on Friday. Today quotations dropped back to 10c., 35 points above the price of a week ago.

The Week's Prices. Cents Per Pound for Early Delivery

	Feb. 16	Feb. 17	Feb. 18	Feb. 19	Feb. 21
Electrolytic copper, Conn.*	10.00	10.00	10.00	10.00	10.00
Lake copper, N. Y.	10.125	10.125	10.125	10.125	10.125
Straits tin, spot, New York	40.50	41.75	42.375	....	41.875
Zinc, East St. Louis	4.75	4.75	4.75	4.75	4.75
Zinc, New York	5.10	5.10	5.10	5.10	5.10
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 15.875c. a lb., prompt, f.o.b., New York.
Antimony, American, 13.75c. per lb., prompt shipment, New York.
Quicksilver, $77.00 to $79.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 10.25c. a lb., less carload, delivered in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	43.50c. to 44.50c.
Tin, bar	45.50c. to 46.50c.
Copper, Lake	11.00c. to 12.00c.
Copper, electrolytic	11.00c. to 12.00c.
Copper, castings	10.50c. to 10.75c.
*Copper sheets, hot-rolled	18.125c.
*High brass sheets	16.625c.
*Seamless brass tubes	19.375c.
*Seamless copper tubes	18.625c.
*Brass rods	12.625c.
Zinc, slabs	6.25c. to 7.25c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	11.00c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	6.625c. to 7.625c.
Lead, sheets, cut	8.00c.
Antimony, Asiatic	16.00c. to 17.00c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	29.00c. to 31.00c.
Babbitt metal, commercial grade	20.00c. to 50.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 25 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	46.25c.
Tin, bar	48.25c.
Copper, Lake	11.00c. to 11.25c.
Copper, electrolytic	11.00c. to 11.25c.
Copper, castings	10.75c.
Zinc, slabs	7.25c. to 7.50c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.25c.
Antimony, Asiatic	18.50c.
Babbitt metal, medium grade	19.50c.
Babbitt metal, high grade	48.75c.
Solder, ½ and ½	26.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.625c.	8.375c.
Copper, hvy. and wire	7.00c.	7.50c.
Copper, light and bottoms	6.125c.	6.375c.
Brass, heavy	4.375c.	5.00c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.50c.	7.00c.
No. 1 yel. brass turnings	4.375c.	4.875c.
No. 1 red brass or compos. turnings	6.25c.	6.75c.
Lead, heavy	3.875c.	4.25c.
Cast aluminum	9.875c.	11.00c.
Sheet aluminum	11.50c.	13.00c.
Zinc	2.625c.	3.875c.

Lead

A better rate of consumption and inventories that have reached a very low level resulted in fairly heavy buying of March metal during the week. The volume of sales was the best experienced since the January spurt and was estimated to have been around 7000 tons. The domestic price remains unchanged at 4.50c. per lb., New York. The London market has also shown improvement and moderate tonnages were disposed of at prices ranging up to 3.50c. per lb., today's quotation.

Zinc

Although the volume of sales for the past week showed little change from the preceding week, a pronounced hardening of the price position was evident, and it is reported that sellers are somewhat reluctant to book metal beyond the third quarter at the current price level of 5.10c. per lb., New York. A slight improvement in the galvanizing rate over the past two weeks has also been instrumental in strengthening the present price position. Trading in London was fairly active all week and prices advanced from 3.06c. per lb., the price of a week ago, to 3.28c., this morning's quotation.

Tin

In another effort to balance production and consumption, the International Tin Committee has reduced quotas from 70 to 55 per cent for the second quarter, a decrease, on paper, equal to 30,000 tons a year. However, considering the size of hidden stocks bearing on the market, the effect of the cut is simply to compensate for these stocks. The first announcement of the action on Friday developed bullishness in the market and the heavy buying that ensued advanced prices to 42.375c. Today prices receded to 41.875c. per lb., New York, for Straits metal, as it was recognized that the cut would have little effect on supplies. The average price for the week ended today is 41.625c., up 0.875c. from the previous week. Cash standards in London were quoted at £185 5s. on first call this morning, a gain of £4 over the price of a week ago.

Brass and Bronze Ingots

The average prices received by members of the Non-Ferrous Ingot Metal Institute during the 28-day period ended Jan. 21 on 80-10-10 and 85-5-5-5 per cent brass were 12.77c. and 11.04c. per lb. respectively. These compare with 12.864c. and 11.102c. in the preceding period. Deliveries in January amounted to 2774 tons, a decrease of 1172 tons from December.

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . New machinery orders are spotty, as are inquiries.

o o o

. . . Ford buying for several programs reflected in many centers.

o o o

. . . Other automotive activity brewing.

o o o

Some Railroad Lists Out in Chicago

CHICAGO—The outlook for sales of machine tools in this district is not bright. Prospects of large industrial programs are few. The outstanding inquiry is for tooling for production of a new small tractor at International Harvester Co., but developments are slow. A sizable list emanated last week from the Milwaukee Road, some 20 items, including two lathes, two milling machines, and three boring mills. The Santa Fe is asking bids on two lathes, a shear and a bending brake. Rockford builders are reported quiet, backlogs being almost entirely cleaned up. Some plants elsewhere continue to lean heavily on foreign support.

Slight Pick Up Noted in Industrial Buying

NEW YORK — Several dealers report more noticeable activity in the past week in the shape of orders coming from diversified industry, rather than from firms favored with Army and Navy contracts. While these latter are still potent market factors, it is considered an encouraging sign to see more diversified buying. Inquiries are still holding up in good volume, and some offices are busier than they have been in years in making proposals. Should confidence return and all this potential business be converted into orders at once, most builders would be swamped and deliveries would be long delayed. Continued foreign purchases are sustaining backlogs now, although new business has subsided somewhat from the peak volume attained in December.

Cleveland Firms Benefit from Ford Orders

CLEVELAND—Foreign business continues as the bulwark of the machine tool industry, and holds promise this month of exceeding the high average attained in January. On the domestic side, the automobile industry seems to offer the best prospect for activity. It is understood that the Ford Motor Co. is considering an equipment replacement program which may involve 30 or more lathes, six to 10 horizontal boring mills and a number of miscellaneous machines such as planer type millers and standard planers.

Ford Motor Co. recently was shipped a large forging press from Cleveland, and a similar 270,000-lb. machine is reported under construction here for the same company. In Northern Ohio, inquiry for machine tools has improved, but actual orders are slow in developing. Given better general business conditions, a number of companies with expansion programs all arranged will undoubtedly go ahead later this year.

Equipment Being Bought for New Motors

DETROIT—A small transmission and four-cylinder motor at the Ford Motor Co. is already resulting in purchase of some new equipment. Ultimate use of the motor and equipment is not known. Activity reported recently on the Ford tractor and the consolidated tool and die shop continues. It has been learned that much of Chrysler's activity recently, which has centered around engines, actually calls for engines similar to current production, not an entirely new design; this has aroused speculation as to the real nature of Chrysler's program for next year.

Orders and Inquiries Off at Pittsburgh

PITTSBURGH — Inquiries during the past week have slowed up some, and most dealers ascribe this to caution resulting from general business conditions. Orders have also fallen off somewhat, but business so far this month is practically equal to the total placed in January. Demand is more or less restricted to single machines, and no lists have come out recently.

Cincinnati Orders Unchanged, Inquiries Active

CINCINNATI—A slight easing of foreign machinery demand with an almost equal increase in domestic ordering was reported the past week. Thus, the general appearance of the market is unchanged, but the underlying factors give substance to optimism. Extent of ordering is withheld, but builders indicate that no large multiple unit contracts were put on the books. Milling machines, lathes and grinders still hold the spotlight of consumer interest. Shapers and shearing machinery are in fair demand, but drills are noticeably dragging. Planers and boring mills are receiving fair demand and the market on these types is being sustained. Inquiry is still very active and the trade feels any change in business feeling will bring a rise in ordering.

Factories curtailed operations a trifle the past week to a level of about 45 per cent. One or two plants are still running night forces.

RAILROAD BUYING

Chicago, Burlington & Quincy has ordered 100 ballast cars from American Car & Foundry Co.

Interborough Rapid Transit Co., New York, is contemplating the purchase of 50 passenger cars.

New York, New Haven & Hartford has ordered 10 diesel-electric locomotives from American Locomotive Co. and 50 passenger cars from Pullman Standard Car Mfg. Co.

Western Pacific has applied to Interstate Commerce Commission for an RFC loan of $3,600,000, to be issued in trustees' certificates maturing Dec. 31, 1938, to finance the following construction and repair program: 250 50-ton box cars, $700,000; 100 50-ton flat cars, $250,000; 50 50-ft. gondola cars, $135,000; 134.26 miles of new rails, $1,896,284; extension of shop and facilities at Sacramento, Cal., $460,000; substitution of steel sides and doors for wooden sides and doors on 98 automobile cars which are to be converted into box cars, $149,450; substitution of steel drop doors and steel ends for wooden drop doors and wooden ends on 100 gondola cars, $86,600.

Union Pacific has announced resumption of work at its Portland, Ore., Grand Island, Neb., and Omaha, Neb., shops, which was suspended 30 days ago. The road is working on a car building program for which $9,000,000 is ultimately to be spent.

The Milwaukee Road, largely as a gage of cost, time and construction efficiency, recently completed at its West Milwaukee shops construction of an oil-burning locomotive of the 4-8-4 type, the first engine to be completely assembled in the shops since 1914. The estimated budget cost was $122,500, while actual cost was approximately $120,000, and working time was 25 days, against an estimate of 50 days. Existing facilities were employed, no new tools or other equipment having been necessary. Prior to 1914 the West Milwaukee shops built the system's Mikado freight engines and finally only its switching units. The department since then has been used for general locomotive repairs and service.

RAILS AND TRACK SUPPLIES

Bangor & Aroostook has ordered 1940 tons of rails from Bethlehem Steel Co. and 950 tons from Carnegie-Illinois Steel Corp.

New York, New Haven & Hartford has received permission to purchase 7580 tons of rails.

Tool Steel Reduced By Vanadium Alloys

VANADIUM ALLOYS STEEL CO., Pittsburgh, whose chief product is high speed tool steel, has reduced the base price on this item from 80c. to 67c. a lb.

FABRICATED STEEL

. . . Lettings higher at 12,770 tons.

o o o

. . . New projects 13,865 tons.

o o o

. . . Plate awards call for 2650 tons.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Newington, Conn., 400 tons, infirmary.

Barnet, Vt., 100 tons, State bridge.

Queens, N. Y., 1386 tons, northerly unit of Flushing bridge; bids received until March 3 by Department of Public Works. Contract includes 24,000 sq. ft. of wire mesh and 4500 lin. ft. of bearing piles.

New York, 1800 tons, transportation building, World's Fair for various railroad companies.

New York, 1100 tons, exposition building at World's Fair for Ford Motor Co.

Buffalo, 230 tons, State bridge.

Buffalo, 250 tons, Pennsylvania Railroad grade crossing; bids March 1.

Buffalo, 250 tons, dope room and zinc foundry for Curtiss Aeroplane Division, Curtiss Wright Corp.

Albany, 100 tons, Media building; W. J. Murray Construction Co., Albany, general contractor.

Auburn, N. Y., 160 tons, railroad bridge for Auburn prison; Acme Railroad Constuction Co., Cleveland, general contractor.

New Lisbon, N. J., 170 tons, almshouse for Burlington County.

Marlboro, N. J., 200 tons, State hospital building.

Danville, Pa., 500 tons, hospital building, General State Authority.

Indiana, Pa., 300 tons, buildings, Indiana State Teachers' College.

Mont Alto, Pa., 860 tons, State tuberculosis sanatorium.

New York, 330 tons, curbing West 72nd Street and St. Clair Place, New York Central Railroad, to American Bridge Co., Pittsburgh.

New York, 545 tons, Canal Street post office, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

New York, 245 tons, Consolidated Edison building at World's Fair, to Belmont Iron Works, Philadelphia.

New York, 210 tons, addition to St. James Protestant Episcopal Church, to Grand Iron Works, Inc., New York.

Lynbrook, N. Y., 6200 tons, Long Island Railroad grade crossing, to American Bridge Co., Pittsburgh.

Eastchester, N. Y., 1050 tons, apartment building project, to Dreier Structural Steel Co., New York.

Dundee, N. Y., 150 tons, grade and high school, to Gray Structural Steel Corp., Syracuse, N. Y.

Edinboro, Pa., 225 tons, State Teachers' College, to Rogers Structural Steel Co., Corry, Pa.

Chester County, Pa., 480 tons, Pennhurst State school, to Keystone Structural Steel Co., Trenton, N. J.

Thompson, Pa., 140 tons, Pennsylvania Railroad bridge repairs, to Fort Pitt Bridge Works Co., Pittsburgh.

California, Pa., 285 tons, State school, to Guibert Steel Co., Pittsburgh.

Greensburg, Pa., 110 tons, Westmoreland Garment Corp. building, to Levison Steel Co., Pittsburgh.

Dover, Del., 140 tons, Hall of Records, to Lansdale Structural Steel & Machinery Co., Lansdale, Pa.

Washington, 200 tons, Dennison Vocational High School, to Fort Pitt Bridge Works Co., Pittsburgh.

THE SOUTH

Guntersville, Ala., 300 tons, dam structures.

Turtletown, Tenn., 245 tons, crusher building.

Nederland, Tex., 565 tons, oil heaters for Lummus Co., to Mosher Steel Co., Houston, Tex.

Galveston, Tex., 150 tons, high school, to Mosher Steel Co., Houston, Tex.

Austin, Tex., 200 tons, H. S. Kress Store to Mosher Steel and Machinery Co., Dallas.

CENTRAL STATES

Cleveland, 250 tons, Linderme Tube Co. plant, to Pittsburgh-Des Moines Steel Co., Neville Island, Pa.

Toledo, Ohio, 365 tons, Fassett Street bridge, to Wisconsin Bridge Co., Milwaukee.

Pleasant Hill, Ill., 260 tons, bridge, to Bethlehem Steel Co., Bethlehem, Pa.

Chicago, 130 tons, grandstand and team rooms, United States Treasury Department, to Hansell-Elcock Co., Chicago.

Clay County, Mo., 120 tons, bridge, to St. Joseph Structural Steel Co., St. Joseph, Mo.

St. Louis, 100 tons, signal system platforms for municipal bridge, to Missouri Bridge & Iron Co., St. Louis.

WESTERN STATES

San Francisco, 150 tons, machine shop for Matson Navigation Co., to Western Iron Works, San Francisco.

Tiburon, Cal., 170 tons, freight apron, Northwestern Pacific Railroad, to American Bridge Co.

CENTRAL STATES

Lawrence County, Ohio, 150 tons, State bridge; Harper Co., Napoleon, Ohio, general contractor.

Cambridge, Ohio, 120 tons, store, Montgomery Ward Co.

Chicago, 130 tons, walls and control gates, Chicago Sanitary District.

Ames, Iowa, 400 tons, high school; bids taken Feb. 23.

Omaha, Neb., 4000 tons, Dodge Street bridge; new bids March 3.

Clarksville, Mo., 2924 tons if welded, 3092 tons if riveted, dam No. 24; Central Engineering Co., Davenport, Iowa, low bidder on general contract.

Palo Pinto County, Tex., 1135 tons, Possum Kingdom dam and power house; bids due Feb. 24.

Jefferson City, Mo., 250 tons, power house for Missouri State Prison; McCarthy Brothers Construction Co., St. Louis, general contractor.

Pike County, Ill., 260 tons, highway bridge, Olson Construction Co., Waterloo, Iowa, general contractor.

Logan County, Ill., 185 tons, highway bridge; Missouri Bridge & Iron Co., St. Louis, low bidder.

Hanover, Kan., 350 tons, State Bridge, Little Blue River.

Hastings, Neb., 150 tons, bridges for Central Nebraska Public Power & Irrigation District; bids March 4.

Lacon, Ill., 1800 tons, bridge.

Wyandotte, Mich., 500 tons, building extension, Firestone Rubber & Metal Products Co.

WESTERN STATES

Coram, Cal., 260 tons, warehouse at Shasta dam, for Bureau of Reclamation.

San Francisco, 125 tons, warehouse for Safeway Stores, Inc.

Loomis, Cal., 125 tons, shops for Bureau of Reclamation.

Mare Island, Cal., 288 tons, caisson gate; Moore Dry Dock Co., Oakland, Cal., low bidder.

Lewiston, Idaho, 950 tons, bridge.

FABRICATED PLATES

AWARDS

New York, 1150 tons, two steel scows for Merritt-Chapman & Scott, to Dravo Corp., Pittsburgh.

Hiwassee Dam, N. C., 335 tons, pipe liners for TVA, to Koppers Co., Pittsburgh.

Detroit, 370 tons, floor plates for city incinerator building, to Fort Pitt Bridge Works Co., Pittsburgh.

Seattle, Wash., 320 tons, oil tank for Shell Oil Co., to Western Pipe & Steel Co., San Francisco.

Coulee City, Wash., about 350 tons, bulkhead gates for Grand Coulee project, to Mississippi Valley Structural Steel Co., St. Louis.

Pasco, Wash., 125 tons, water tank, to Steel Tank & Pipe Co., Portland, Ore.

NEW PROJECTS

Waterbury, Conn., 1200 tons, gas holder.

Sheffield, Ill., 180 tons, deck plate girder spans.

SHEET PILING

AWARDS

New York, 210 tons, North Beach Airport, for Procurement Division, Treasury Department, to Belmont Iron Works, Philadelphia.

NEW PROJECTS

Springfield, Mass., 148 tons, Government project.

New York, 6000 ft. of steel pipe piles, Procurement Division, Treasury Department; bids Feb. 25.

Clarksville, Mo., 3000 tons, dam No. 24, Central Engineering Co., Davenport, Iowa; low bidder on general contract.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Stewart & McGuire, Inc., 350 Fifth Avenue, New York, manufacturer of mechanical vending machines, has leased a three-story building on Thirty-fifth Avenue, between Thirty-sixth to Thirty-seventh Streets, Long Island City, 200 x 240 ft., and will improve for parts production and assembling. Company will remove present plant to new location and install facilities for three new model machines.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until March 11 for radio mast sections in lots of 100 to 240, five different types, and 100 to 240 generator units (Circular 126); until March 14, socket wrenches, terminal mounting plugs, pin jacks, jack boxes, control boxes, transformers, resistors, pin plugs, terminal strips and other equipment (Circular 127).

Jacob Ruppert, 1639 Third Avenue, New York, operating Ruppert Brewery, has let general contract to W. T. Gregory, Flatiron Building, Norfolk, Va., for modernizing two-story building at Norfolk, for new mechanical-bottling works. Plant will be operated under name of Jacob Ruppert Virginia Bottling Corp. Cost close to $75,000.

American Smelting & Refining Co., 120 Broadway, New York, has approved plans for four one-story additions to branch plant at Maurer, near Perth Amboy, N. J. Cost over $75,000 with equipment.

New York City Omnibus Corp., 123 West 146th Street, New York, plans extensions and improvements in repair and maintenance shops and garage at 721 Lenox Avenue for motor bus service. Cost over $150,000 with equipment. Francis Seaman, 140 Cedar Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for motor-driven planers and shapers, with spare parts, for Brooklyn and Philadelphia Navy yards. (Schedule 2841).

United States Engineer Office, New York District, New York, asks bids until March 1 for one forged steel pump shaft (Circular 137).

Albert Haller, Brooklyn, has leased two-story building at 522 Bergen Street, 25 x 100 ft., for new welding shop and general repair works.

Ardell Razor Blade Corp., 91 West Runyon Street, Newark, N. J., has leased building at 300 Jelliff Avenue, for expansion, continuing present works at first noted location.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until Feb. 28 for three motor-driven automatic screw machines (Circular 642), 13 flush pin gages, one position gage and one concentricity gage (Circular 643).

K. & S. Wholesale Grocery Co., 165 Monroe Street, Passaic, N. J., has plans for one-story storage and distributing plant, 60 x 160 ft. Cost over $40,000 with equipment. Goodman & Schulman, 262 Main Street, Paterson, N. J., are architects.

Quartermaster Depot, Twenty-first and Johnston Streets, Philadelphia, asks bids until March 10 for 148,352 galvanized wire tent slips, 42,386 brass triangles, 8390 gross brass grommets, 1605 lb. galvanized iron rings, and 5144 plate and chain assemblies (Proposal 669-176).

Piper Aircraft Corp., Lock Haven, Pa., has arranged financing through sale of 21,500 shares of preferred and 244,437 shares of common stock, part of proceeds to be used for plant expansion and equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Feb. 28 for 128 copper scales (Circular 717); until March 1 for 260 flexible shafts (Circular 718).

BUFFALO DISTRICT

Aetna Gases, Inc., 3155 Seneca Street, Buffalo, manufacturer of industrial oxygen and acetylene gas, etc., has approved plans for expansion and installation of equipment for gas production, tank-filling, etc. Cost close to $35,000.

Frontier Bituminous Materials Corp., Olson Building, Lockport, N. Y., plans new mechanical-mixing plant at quarry of Pekin Stone Products Corp. Cost over $30,000 with mixing and mechanical-handling equipment.

Board of Education, Salem, N. Y., plans manual training department in new multi-story central school, for which bids will be asked at once on general contract. Cost about $445,000. Financing has been arranged through Federal aid. C. W. Clark, 27 North Main Street, Cortland, N. Y., is architect; A. R. Acheson, Eckel Theater Building, Syracuse, N. Y., is consulting engineer.

NEW ENGLAND

Waterfalls Paper Mills, Inc., Mechanic Falls, Me., manufacturer of coated and other paper stocks, will make extensions and improvements in mill, including new equipment in finishing department and other divisions. Cost about $100,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for portable electric ventilating fans and spare parts (Schedule 2846); until March 8, propeller shaft revolution-indicating equipment and spare parts (Schedule 2863) for Boston, Charleston and Puget Sound Navy yards.

Board of Education, Chicopee, Mass., plans one-story addition to trade school, for which bids will be asked soon on general contract. Cost about $100,000 with equipment. Financing has been arranged through Federal aid. Henry J. Tessier, 220 Dwight Street, Springfield, Mass., is architect.

Lynn Gas & Electric Co., Lynn, Mass., plans rebuilding coal storage and handling plant recently destroyed by fire, including 300-ft. fuel-loading tower and conveyor, coal-lifting derricks and other mechanical equipment. Loss about $750,000.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until March 1 for line reamers, thread mills, shank cutters, shank milling cutters, roughing reamers, one set of mill cutters, one form cutter and one thread-milling hob (Circular 154).

WASHINGTON DIST.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for two watertube boilers, coal-pulverizing and burning equipment, mechanical fans, soot blowers, blow-down equipment, combustion control equipment and auxiliary equipment for power house at marine barracks, Quantico, Va. (Specifications 8659).

Arundel-Brooks Concrete Corp., 921 South Wolfe Street, Baltimore, has let general contract to S. B. Brooks, Inc., South and Water Streets, for new mechanical-mixing plant in Woodberry district, consisting of three one-story units. Installation will include mixing machinery, steel storage tanks, conveyors, elevators and other mechanical equipment. One building will be used as a service, repair and garage unit for company motor trucks. Cost over $50,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until March 2 for 12 concrete carts, one collapsible scraper, steel or wrought iron turnbuckles, two stockless anchors of 250 to 300 lb. each, two polar planimeters, brass fire hose nozzles, one 27-cu. yd. gasoline engine-driven paving concrete mixer (Schedule 3334).

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until March 10 for 525,000 ⅞-in. brass web strap buckles and 1416 gross of ⅞-in. brass clinch clips (Circular 254).

Virginia Bridge Co., Roanoke, Va., is arranging fund of about $170,000 for modernization and replacements in equipment at structural steel fabricating plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for one motor-driven plain milling machine (Schedule 2865), six steam cargo winches and spare parts (Schedule 2867); until March 7, two fire alarm panels and spare parts (Schedule 2872) for Norfolk, Va., Navy Yard; until March 1, four crawler-type shovels, three crane booms and three clamshell buckets (Schedule 2862 for Sewall's Point yard; 25,200 lb. of steel propeller shafts (Schedule 2858) for Portsmouth Navy Yard; until March 4, 10,000 lin. ft. of ½-in. brass pipe (Schedule 2845), aircraft generator test stand adapters (Schedule 900-1526), spare parts for airplanes (Schedule 900-1519), wrenches for powder tanks (Schedule 2854) for Eastern and Western Navy yards.

SOUTH ATLANTIC

Swift & Co., Union Stock Yards, Chicago, have let general contract to Fiske-Carter Construction Co., Masonic Temple Building, Greenville, S. C., for new three-story branch plant, 100 x 100 ft., at Asheville, N. C. Cost about $100,000 with equipment.

United States Engineer Office, Charleston, S. C., asks bids until March 1 for one steel propeller shaft (Circular 45), one direct-current electric generator, not less than 5000-watt capacity (Circular 44).

School Board, Ridgeland, S. C., plans one-story vocational building at high school. Fund of $28,461 has been secured through Federal aid and additional appropriation will be arranged for building and equipment.

SOUTH CENTRAL

Union City Canning Co., Union City, Tenn., food packer, has plans for new one-story plant, 80 x 135 ft., on site of present factory, which will be razed. Cost over $50,000 with equipment.

Purchasing and Contracting Officer, Quartermaster Depot, Fort Thomas, Ky., asks bids until March 4 for wrought iron pipe, copper pipe, cast iron radiators, radiator valves, locks, nails, hasps and other equipment (Proposal 906-25).

Electric Power Board, Municipal Building, Chattanooga, Tenn., Harold C. Fiske, chairman, asks bids until March 7 for 44,000-volt transmission lines from Chickamauga power dam of Tennessee Valley Authority to new local power substations Nos. 1, 2, 3 and 6, including aerial crossing over Tennessee River at foot of Fulton Street; until March 14 for 11 transformers and auxiliary equipment for 44,000-volt power substations Nos. 1, 3 and 6. Cost about $105,000. Bids will be asked soon for oil circuit breakers to cost about $100,000.

American Bakeries Co., Salcedo Street, New Orleans, has plans for one and two-story addition, 100 x 160 ft., to Merita bakery, address noted. Cost over $50,000 with ovens, conveyors and other mechanical equipment. Sam Stone, Jr., & Co., Masonic Temple Building, are architects.

SOUTHWEST

Griesedieck Brothers Brewery Co., 1920 Shenandoah Street, St. Louis, has asked bids on general contract for two-story addition to mechanical-bottling plant, 163 x 180 ft. Cost about $150,000 with equipment. Janssen & Janssen, Chemical Building, are architects.

Department of Revenue and Accounting, H. J. Nester, commissioner, Stillwater, Okla.,

For Silence in High Speed Machines
BAKELITE LAMINATED GEARS

THE CIGARETTE-MAKING UNIT, pictured, is but one of many types of machines in which Bakelite Laminated gears and pinions render valuable service by reducing noise and its accompanying production losses. For light high-speed equipment and heavy machines, alike, these gears absorb destructive vibration ... save depreciation on complete assemblies and nerve-strain on operators.

Bakelite Laminated gears and pinions are unharmed by water, oil and a wide variety of chemicals. They resist wear from atmospheric dust and grit ... and reduce wear on the costly metal gears they contact. We invite you to investigate the important possibilities of Bakelite Laminated *silent* gears for improved design and operation of all geared machinery. Write for our 52-page booklet 2L, "Bakelite Laminated."

Visit the Bakelite Travelcade — an exposition of "Modern Plastics for Modern Living". Museum of Science and Industry, Rockefeller Center, New York City, March 1 to 31.

BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.

BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Canada *West Coast:* Electrical Specialty Co., Inc., 316 Eleventh Street, San Francisco, Cal.

BAKELITE

REGISTERED U. S. PAT. OFF.

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

LAMINATED GEARS · PINIONS · PULLEYS · CASTERS

asks bids until Feb. 28 for one steam-generating unit for municipal electric power plant.

Board of Education, Library Building, Kansas City, Kan., plans installation of manual training department in new three-story summer high school at Eighth and Oakland Streets, for which general erection contract will be let soon. Cost about $750,000. J. W. Radotinsky, Commercial National Bank Building, is architect.

Puffed Cereals Co. of Missouri, Inc., St. Louis, recently organized as a subsidiary of Puffed Cereals, Inc., Minneapolis, Minn., has leased four-story building at First and Spruce Streets, and will improve for new processing plant for cereal production. Cost over $50,000 with equipment.

City Council, Alma, Kan., has plans for improvements in municipal electric power plant, including additional equipment. Cost about $50,000. Bond issue has been approved. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., and Farmers' Union Building, Salina, Kan., are consulting engineers.

Lindsay-Bronia Winery & By-products Co., Mission, Tex., has plans for new one-story winery with storage and distributing buildings. Cost close to $50,000 with equipment.

Wood County Electric Co-operative, Inc., Quitman, Tex., asks bids until March 2 for rural electric distributing system, totaling about 114 miles, with operating and service facilities. Cost close to $110,000. Financing has been arranged through Federal aid. William G. Morrison, Professional Building, Waco, Tex., is consulting engineer.

WESTERN PA. DIST.

Superior Steel Corp., Grant Building, Pittsburgh, has asked bids on general contract for modernization and improvements in mill at Carnegie, Pa., preparatory to installation of new equipment in cold rolling and other divisions.

West Penn Power Co., West Penn Building, Pittsburgh, plans extensions in transmission lines in Ridgeway, Elk and neighboring townships, about 25 miles. Cost over $50,000.

General State Authority, 600 North Second Street, Harrisburg, Pa., A. S. Janeway, executive director, has let general contract to A. J. Sordoni, 45 Owen Street, Forty Fort, Pa., for new three-story junior high school, two-story shop and equipment storage building, and addition to steam power house at State Teachers College, Bloomsburg, Pa. Cost over $500,000 with equipment.

OHIO AND INDIANA

Eaton Mfg. Co., 739 East 140th Street, Cleveland, automobile axles, springs, bumpers, etc., has asked bids on general contract for extensions and improvements in plant, including alterations in power house. Cost over $80,000 with equipment. George S. Rider Co., Terminal Building, is architect.

Reliance Foundry Co., 506 East Front Street, Cincinnati, manufacturer of gray iron castings, has asked bids on general contract for one-story addition, 114 x 172 ft., for expansion in foundry, core room and other departments. Cost over $75,000 with equipment.

Linderme Tube Co., 1291 East Fifty-third Street, Cleveland, manufacturer of copper tubing, has plans for new one and two-story plant, 120 x 440 ft., on East 219th Street, Euclid. Installation will include two 60-ft. three-ton monorail systems and other mechanical-handling equipment. Cost over $175,000 with machinery. Edward G. Hoefler, 5005 Euclid Avenue, Cleveland, is engineer.

Contracting Officer, Materiel Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until March 1 for cotter and taper pins (Circular 679); until March 3, 10 electric fuel gage indicator assemblies (Circular 709), one crane-type electric truck, capacity not less than 3000 lb. (Circular 705), 730 flexible gun post sight assemblies, three tow target windlass frames, five tow target windlass gears, five tow target windlass shafts, 40 bomb release handle stop assemblies and 200 gun control switch assemblies (Circular 710); until March 4, 36 30-in. wheel assemblies, 18 hydraulic brake assemblies, 21 wheel assembly-tail, smooth contour (Circular 695), eight oil pump assemblies (Circular 711).

Patoka Coal Co., Cato (Pike County), Ind., plans extensions and improvements in coal-mining properties, including modernization of present facilities, new tipple, new mining machinery, mechanical-handling and other equipment. Cost over $200,000. Work is scheduled to begin early in spring.

MICHIGAN DISTRICT

Eddy Paper Corp., Three Rivers, Mich., has approved plans for new power plant at branch mill at White Pigeon, Mich., authorizing an appropriation of $300,000 for building and equipment.

Galloup Pipe & Supply Co., Kalamazoo, Mich., pipe, fittings and kindred products, has plans for one-story addition for storage and distribution. Cost close to $30,000 with equipment.

F. L. Jacobs Co., 1043 Spruce Street, Detroit, manufacturer of metal tubing, automobile cranks and other automotive products, has acquired W. I. T. Mfg. Corp., College Park, Md., and its subsidiary, Air-Track Mfg. Corp., same place, manufacturer of mechanical equipment, and will consolidate.

City Council, Hillsdale, Mich., has called a special election April 18 to vote bonds for $130,000, to which will be added a fund of about $70,000, making an appropriation of $200,000 for extensions and improvements in municipal electric power plant, including installation of diesel engine-generator units and auxiliary equipment. Hamilton & Webber, Grand Rapids, Mich., are consulting engineers.

MIDDLE WEST

Armour & Co., Union Stock Yards, Chicago, have acquired about 15-acre tract on Lockwood Drive, Houston, Tex., for new plant, for which bids will be asked soon. It will include power house, machine shop and other mechanical departments. Cost close to $1,000,000 with equipment.

Rapid Roller Co., 2558 South Federal Street, Chicago, manufacturer of printers' rollers and allied equipment, has filed plans for two-story addition, 40 x 100 ft., for which general contract recently was let to Schless Construction Co., Inc., 236 North Clark Street. Cost close to $40,000 with equipment. Ray C. Brown, 333 North Michigan Avenue, is architect.

United States Engineer Office, Post Office Building, Chicago, asks bids until March 15 for furnishing and erecting one steel building, with steel frame and galvanized steel sheets, and necessary appurtenant work, at Joliet, Ill. (Circular 88).

City Council, New Hampton, Iowa, plans extensions and improvements in municipal electric power plant, including diesel engine-generator unit and auxiliary equipment. Cost over $150,000. Richard E. Lutz, Minneapolis, Minn., is consulting engineer.

Purchasing and Contracting Officer, Office of District Quartermaster, CCC, Omaha, Neb., asks bids until Feb. 28 for drill press, grinders, jig saws, lathes, mandrels, shaper, jointers, cutters, files, routers, sanders, buffing wheels and other power tools, 165 items in all (Proposal 5701-64).

Lake Region Co-operative Electrical Association, 114 North Mill Street, Fergus Falls, Minn., Nobel Huse, secretary, asks bids until March 1 for rural electric system, about 150 miles, including wire and cable, pole hardware and fittings, service facilities, etc. Cost close to $150,000. Pillsbury Engineering Co., 1200 Second Avenue South, Minneapolis, is consulting engineer.

United States Engineer Office, Fort Peck, Mont., asks bids until Feb. 28 for 50 alloy steel chain slings for moving heavy riprap rock from railroad cars to ground with cranes (Circular 220).

Fairbanks, Morse & Co., Chicago, with main works at Beloit, Wis., have been awarded contract by Navy Department amounting to $1,750,000 for ship service equipment on two new battleships. Order to be completed in 14 months calls for eight 850-kw. electric generator sets, each driven by a 1350-hp. diesel engine, and four 200-kw. sets, each powered by a 300-hp. diesel. Shop production will start about May 1.

Carroll Packing Co., Prairie du Chien, Wis., has been organized by William D. Carroll, to remodel and enlarge existing buildings and establish general meat packing plant. Boiler house, 32 x 40 ft., and new cold storage unit will be erected. Cost about $75,000.

PACIFIC COAST

Johnston Fruit Co., Santa Barbara, Cal., fruit packer, has approved plans for one-story plant, totaling about two and one-half acres of floor space, and will proceed with erection. Cost about $200,000 with mechanical-handling equipment. W. W. Ache, 301 North Citrus Avenue, Los Angeles, is architect.

Bureau of Reclamation, Denver, asks bids until March 1 for one steel warehouse building at Shasta Dam, Central Valley project, Cal. (Specifications 1037-D); until March 31 for 80 102-in. ring-seal gates and 40 sets of conduit linings for installation in outlet works at Grand Coulee Dam, Columbia Basin project, Wash.; three 102-in. ring-seal gates for power penstocks at Seminoe Dam, Kendrick project, Wyo. (Specifications 774).

Ballard Foundry Co., 4315 Burns Street, N.W., Seattle, gray iron castings, etc., has filed plans for one-story foundry, 60 x 120 ft. McClelland & Jones, Republic Building, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for one motor-driven, light-duty engine lathe (Schedule 2840) for San Diego, Cal., Naval Air Station; until March 8, two motor-driven gasoline pumps and spare parts (Schedule 2875) for Mare Island Navy Yard.

Citrus Union High School District, Glendora, Cal., has plans for one-story U-shaped vocational training shop at Citrus Union high school, 35 x 106 ft., for which bids will be asked soon on general contract. An automobile repair, metal-working and welding shop will be installed with other mechanical units. Cost about $40,000. John C. Austin, Chamber of Commerce Building, Los Angeles, is architect.

Supply Officer, Puget Sound Navy Yard, Bremerton, Wash., asks bids until March 3 for ball bearings (Req. 205-NSA).

FOREIGN

Welsh Metal Industries, Ltd., Caerphilly, Glamorgan, England, recently organized to manufacture sheet metal products, galvanized hollow-ware and kindred metal goods, has acquired five and one-half acre tract for new plant, for which superstructure will begin soon. Cost over $200,000 with equipment.

Federal Department of Industry, Mexico, D.F., has selected tract near Acapulco, Mexico, on Pacific Coast, for new federal-owned plant for manufacture of commercial fertilizers. It will include power house, machine shop and other mechanical structures. A fund of 1,500,000 pesos (about $415,000) has been authorized for project.

Armco (Australia) Pty., Ltd., Temple Court, Melbourne, Australia, has purchased about 80 acres of Government land at Port Kembla, Victoria, New South Wales, for new mill for production of steel sheets for automobile body manufacture and other service. Works will comprise one and multi-story units, with power house and other operating divisions. Company has agreed with Government to expend $2,000,000 on project during next 24 months. It is a subsidiary of American Rolling Mill Co., Middletown, Ohio.

General Motors Corp., Detroit, has authorized expansion in motor truck assembling works at Mexico, D.F., to provide a new division for assembling of passenger automobiles. Cost over $1,000,000 with equipment.

THE RESPONSIBLE METAL FOR RESPONSIBLE JOBS

WHERE CORROSION'S IN THE WIND

What Rustless stainless steel can do in solving your corrosion problem is convincingly demonstrated by its performance in marine applications. In rub-rails, propeller shafts, pumps, cables, stays, shackles, fittings and similar uses, this finer stainless steel defies sea air and salt spray—a test of exceptional severity.

The Rustless organization produces stainless steel exclusively . . . and so has time to concentrate on the extra quality, the added uniformity, that accelerate production for the user. If your product faces difficult service conditions, find out what Rustless has done for others, and what it can do for you.

RUSTLESS IRON AND STEEL CORPORATION · BALTIMORE · MD.

Producing Stainless Steels Exclusively

RUSTLESS
STAINLESS STEEL
BARS AND WIRE

SALES OFFICES: CHICAGO—4013 MILWAUKEE AVE. • **CLEVELAND**—731 SOCIETY FOR SAVINGS BLDG. • **DETROIT**—4-137 GENERAL MOTORS BUILDING • **PHILADELPHIA**—1263 COMMERCIAL TRUST BUILDING • **DISTRIBUTORS IN PRINCIPAL CITIES**

148th A. I. M. E. Meeting

(CONTINUED FROM PAGE 35)

and their effect on distribution is very difficult to determine. The factors affecting distribution will be discussed in the order in which their effect can be most definitely determined.

Pouring the ingots higher raises the point of maximum analysis higher in the ingot. An increase of from 67 to 84 in. in ingot height raised the analysis peak from 85 to 88 per cent of the ingot height. In the taller ingots the peak will be sharper and give a higher extreme concentration than in shorter ingots.

Low pouring temperatures give peaks of higher concentration in the distribution curves than high pouring temperatures. With high pouring temperatures there is a sharp drop in carbon and manganese through the rim from the edge of the ingot to the secondary blowholes. With low pouring temperatures there is little or no drop in analysis across the rim.

Capping the ingot early reduces the width of the rim zone but does not alter the distribution within the rim and core zone. Late capping increases the width of the rim zone and raises the analysis throughout the core zone, but has little effect on the relative distribution within the core zone.

Ingots that rim in flat or rise slightly during rimming have peaks of higher concentration than ingots that drop slightly during rimming.

Heats that are under-oxidized in the furnace have very sharp peaks of high concentration and the area of uniform analysis in the core extends high in the ingot.

As a summary of their work, the authors pointed out particularly that the term "normal" has been used with the realization that it applies to only one type of practice and one type of steel and represents a more or less arbitrary selection. However, ingots that showed the greatest departure from normal retained the essential differences in distribution between carbon, manganese and sulphur.

Near the top of the ingot, carbon decreases across the rim, increases sharply at the secondary blowholes and increases from the secondary blowholes to the center of the ingot. At half the height of the ingot the carbon decreases slightly across the rim, increases at the secondary blowholes and is practically constant across the core zone. Near the bottom the carbon is practically uniform across the ingot.

Manganese decreases across the rim zone all the way around the ingot. At the top of the ingot there is an increase in manganese at the secondary blowholes and at the bottom there is a decrease in manganese at the secondary blowholes. In the core zone the manganese increases from the bottom to the top of the ingot but the increase is much smaller than for either carbon or sulphur.

Sulphur is practically constant throughout the rim zone and shows a sharp increase at the secondary-blowhole zone. The increase in sulphur in the core zone between the bottom and top and between the secondary-blowhole zone and the center of the ingot is much greater than the increase in manganese or carbon.

The effects of variation in practice are more indicative than final, and no attempt was made to determine the distribution in different analysis ranges.

Malleable Iron Founders Start Research Program

MALLEABLE FOUNDERS' SOCIETY, Cleveland, recently set in motion a two-point research program for the current year.

The first phase, covering practical research, includes correlation of existing information on processes and equipment employed by members of the society. The immediate objective of the practical survey will be the developing of reliable standards for annealing.

The second major activity, involving pure research, will feature special studies of products other than normal malleable iron. The research committee is being aided in the program by plant metallurgists and laboratory technicians from the society's membership.

A Book on Protection of Inventions

"INVENTIONS and Their Protection," by George V. Woodling, and published by the Penton Publishing Co., Cleveland, is a practical book for engineers, designers, machine tool builders, electrical engineers, mechanical engineers, steel mill engineers and others.

In 16 chapters covering 316 pages the author presents patent law in a clear manner. Non-technical language has been used throughout. Much of the material has been inspired by actual questions which have confronted the author as an engineer and later as a patent attorney.

Not the least valuable part of the work are the charts which guide the reader into a simple understanding of the points in question. They show the factors governing the originality and ownership of inventions and the various requirements of patentability.

The author presents various diagrams in interpreting prior art which anticipates invention. The parties involved in the procedure are shown. The length of lines in the diagrams indicate the passage of time. In each diagram the length of time between actions is comparable to the length of the respective lines.

Wisconsin Vocational Schools Offer Foundry Course

PRINCIPAL vocational evening schools in the chief industrial centers in Wisconsin are offering a three-year course in foundry practices under the auspices of the Milwaukee chapter of the American Foundrymen's Association. The course will include training in metals, elementary work in the foundry, melting practices, sand control, molding, blueprint reading, heat treatment and other correlated subjects.

The gray iron group is under the direction of John Genthe, Harnischfeger Corp.; the steel group under Edward Daehn, Pelton Steel Co.; malleable group under Joseph Gutenkunst, Milwaukee Malleable & Grey Iron Co., and non-ferrous group is under William Bornfleth, Cutler-Hammer, Inc.

Pioneer Engineering & Mfg. Co., 31 Melbourne Avenue, Detroit, maker of Hollway positive displacement Coolant and Lubricant pumps and Pioneer impelling type Coolant and Lubricant pumps, has appointed Willis J. Stutson Co., 184 Wacker Drive, Chicago, as exclusive representative in the Chicago and northern Illinois territory.